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# Dietary Consultation—A Service for Small Institutions

## II. Menu Planning

**Compiled by Grace McMahon[1] for the National Committee[2] of the Community Nutrition Section of the American Dietetic Association on Preparation of a Manual for Use in Dietary Consultation Service to Institutions without Trained Food Service Personnel**

MENU planning is a universal task and a universal problem. It is not strange, then, that the consulting dietitian has had more requests for help in menu planning than for any other type of assistance. Conveying appropriate, constructive advice, however, is often difficult. As a counselor rather than a direct supervisor, the consultant must translate the basic scientific principles of menu planning for practical application by untrained individuals.

The basic principles of menu planning have been a part of the dietitian's education since the beginning of her professional training. She is taught, as evidenced in the text by West and Wood (1), to think in terms of nutritional requirements, food habits, money to be spent, the availability and seasonability of foods, personnel, equipment and plant, and type of service, as well as procedures and menu forms. It is because of this broad understanding of all the influences on menu planning that the consultant is particularly qualified to give advice. She is able to appraise an institution's food service quickly and easily. Most important of all, she can interpret the situation to lay personnel. It is at this point that the consultant's services are of the greatest advantage. Literature alone—manuals and other guides—cannot take the place of personal, individualized instruction of untrained personnel who, without outside help, are apt to be confused in attempting to relate so many seemingly formidable factors to menu planning.

The consultant's recommendations will vary in each situation. Often, the untrained person thinks there is something quite mysterious about menu planning. Even requirements for the essential basic foods may be confusing. It is possible, too, that the menu planner does not appreciate the need for adequacy in diets, and teaching must begin with a dramatic explanation of its importance. On the other hand, a nurse or someone who has had some dietetic training may be in charge of menu planning and require less basic instruction. In any case, menu planning must be introduced in a simple, clear, concise manner. It must be presented at the employee's level of understanding so that it can be quickly comprehended.

The purpose of the following discussion is to consider the most common problems of menu planning encountered in consultation service to small institutions: (a) providing the institutional personnel with appropriate methods for planning menus that will meet the nutritive needs of specific groups; (b) planning for the use of foods grown by the institutions; (c) devising systematic mechanics of menu planning; and (d) furnishing new ideas and sources of new ideas for menus.

The solution to these problems may be facilitated by use of the references included at the end of the discussion. The bibliography contains new and pertinent material of a professional nature for the consulting dietitian's own use; it also provides references to simplified material that can be distributed directly to institutional personnel.

[1] The advice and assistance of the following people is gratefully acknowledged: Mildred Bonnell, Felisa Bracken, Mary Ellen Dambold, Margaret B. Dreisbach, Mary Griffin, Clarice Gullickson, Jane Hartman, Marjorie Heseltine, Edith Holt, Helen Hunscher, Cora Kusner, Rosalind Lifquist, Juanita Cochran Miller, Mary W. Northrop, Helen Phaneuf, Hazel K. Steibeling, Frances Swenson, E. Neige Todhunter, and members of the Executive Board and staff of the American Dietetic Association.

[2] Members of the Committee were: 1946–48—Margaret Walsh, Chairman, Magdalin K. Espy, Elizabeth Perry, Theresa Powers, Wilma Robinson, and Pearl Rorabaugh; 1948–49—Adelia M. Beeuwkes, Chairman, Magdalin K. Espy, Elizabeth Perry, Mary Agnes Pohl, Wilma Robinson, Pearl Rorabaugh, and Jane Sedgwick.

**A. Planning to Meet the Nutritive Needs of the Group**

Reliable nutritional evaluation can be made only in terms of how much food the patient is eating. Thus, the consultant will need to know both the amount of food being purchased and the amount being consumed—not wasted. With this information, a precise evaluation of an institution's menus can be facilitated by using the Recommended Dietary Allowances (2) plus the short method of dietary calculation (3). The new publication, *Composition of Foods—Raw, Processed, Prepared* (4), will provide additional data on individual nutrients in a given food. Of course, food habits, budget, and other factors as mentioned above enter into the evaluation, too. This discussion, however, is limited chiefly to means of providing menus which are nutritionally adequate.

A number of simplified guides are available for use in teaching menu planning in terms of nutritional needs; some are more flexible than others, and the choice of the material for instruction depends upon the background of the employee and the particular need in the menu planning situation.

(a) The Basic Seven is probably the simplest guide for use in daily menu planning. It is easily understood and can be applied by the employee with no scientific background. A menu form based upon the Basic Seven is presented in Table 1.

Although the Basic Seven is a simple guide, its application is limited, since it presents only a general menu pattern. It does not give enough information on actual quantities of foods required to meet the needs of all age groups. In addition, the term "serving" may be misleading. One person may interpret this amount to be 1 Tbsp. and another, ½ cup. Furthermore, no procedure is laid down for interchanging foods from the various groups—as substituting another food for potatoes, or a fruit for a vegetable.

(b) A more precise guide is found in the new manual, *Planning Food for Institutions* (5). Menu planning is approached from the standpoint of purchasing. In the tables are listed quantities of food to be purchased over a thirty-day period to meet the nutritional needs for groups of ten persons of different age, sex, and activity groups. Plans are set up at both low- and moderate-cost levels. The moderate-cost plan has been reproduced in Table 2.

Additional tables are included to facilitate classification of all purchases in terms of the eleven food groups. For example, foods, such as cottage cheese, ice cream, bread and baked goods, must be converted

TABLE 1

MENUS FROM Jan. 1–Jan. 7, incl.

| FOODS TO BE INCLUDED DAILY (OR MENU PATTERN) | MEAL | MON. Jan. 1 | TUES. Jan. 2 | WED. Jan. 3 | THURS. Jan. 4 | FRI. Jan. 5 | SAT. Jan. 6 | SUN. Jan. 7 |
|---|---|---|---|---|---|---|---|---|
| Fruit, citrus<br>Cereal, enriched or whole grain<br>Eggs<br>Bread, enriched or whole grain<br>Butter or fortified margarine<br>Beverage | B R E A K F A S T | | | | | | | |
| Meat<br>Vegetables<br>Potato<br>Green or yellow<br>Bread enriched<br>Butter or fortified margarine<br>Dessert<br>Milk | D I N N E R | | | | | | | |
| Protein dish<br>Vegetable<br>Raw vegetable<br>Fruit, other<br>Bread enriched<br>Butter or fortified margarine<br>Milk | S U P P E R | | | | | | | |

into their basic milk and flour equivalents to determine whether purchases have been adequate. While the material in this manual would be helpful if these plans were followed completely, further assistance would be necessary to interchange food groups, such as eggs and meat, for example, since no comparable nutrient values are given.

(c) A more flexible menu planning guide is the type in which basic menu plans have been developed to show the value and use of each food or food group, and portion sizes required to meet nutritional standards (6). In this case, information is given regarding nutrient values, thus permitting variation and substitution of key foods and food groups without the danger of falling short of nutritional requirements. The meal patterns can be varied for special regional groups and can be adapted to meet problems of availability, acceptability, or economic stress. This type of material is most suitable where used by the consultant, who then revises one of the basic food plans to suit the particular situation.

(d) Another menu planning aid, developed specifically with the hospital in mind, has been published by *Hospitals* (7). Daily menus for the general diet as well as nine modifications for therapeutic use have been listed. Success in the use of this plan depends upon the availability, acceptability, and cost of the specific foods listed, and upon the employee's knowledge of appropriate recipes. Improper variation of the listed menus could result in an inadequate diet, if left entirely to the inexperienced menu planner. Also, while certain quantitative aspects of nutritional need are mentioned, it would be necessary to give additional assistance to educate or inform the menu planner concerning the special needs of the maternity patient, the variations in children's requirements from six years through adolescence (with the different requirements of boys and girls), the needs of the aged, and other specific groups.

In the actual use of the guides which have been discussed above, it would be necessary for the consultant to give additional help to the menu planner. There would be a need to standardize portion sizes in order to provide adequately for quantitative nutri-

TABLE 2

*Food plan at moderate cost. Quantities of food (as purchased), for one month (30 days) for eighteen age, sex, and activity groups (for ten persons)**

| FAMILY MEMBERS | LEAFY†, GREEN AND YELLOW VEGETABLES | CITRUS FRUIT, TOMATOES | POTATOES, SWEET-POTATOES | OTHER† VEGETABLES AND FRUIT | MILK EQUIVALENT‡ | MEAT, POULTRY, FISH | EGGS | DRY BEANS AND PEAS, NUTS | FLOUR EQUIVALENT¶ | FATS AND OILS # | SUGARS, SIRUPS, PRESERVES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *lb.* | *lb.* | *lb.* | *lb.* | *gal.* | *lb.* | *doz.* | *lb.* | *lb.* | *lb.* | *lb.* |
| Children through 12 years: | | | | | | | | | | | |
| 1–3 years | 85 | 85 | 20 | 80 | 65 | 45‖ | 25 | 3 | 55 | 6 | 6 |
| 4–6 years | 95 | 95 | 40 | 110 | 65 | 80‖ | 29 | 3 | 65 | 18 | 24 |
| 7–9 years | 110 | 110 | 75 | 115 | 70 | 110 | 29 | 6 | 85 | 24 | 36 |
| 10–12 years | 130 | 120 | 95 | 125 | 75 | 140 | 29 | 6 | 120 | 36 | 42 |
| Girls: | | | | | | | | | | | |
| 13–15 years | 140 | 120 | 110 | 150 | 75 | 150‖ | 29 | 6 | 120 | 42 | 42 |
| 16–20 years | 140 | 120 | 110 | 150 | 65 | 150 | 29 | 6 | 110 | 36 | 42 |
| Boys: | | | | | | | | | | | |
| 13–15 years | 150 | 130 | 140 | 160 | 75 | 160 | 29 | 12 | 175 | 54 | 54 |
| 16–20 years | 175 | 155 | 180 | 160 | 75 | 180 | 29 | 15 | 230 | 66 | 60 |
| Women: | | | | | | | | | | | |
| Sedentary | 140 | 110 | 85 | 150 | 55 | 150 | 29 | 3 | 75 | 30 | 36 |
| Moderately active | 140 | 110 | 110 | 150 | 55 | 170 | 29 | 6 | 110 | 42 | 42 |
| Very active | 160 | 130 | 130 | 170 | 55 | 170 | 29 | 12 | 160 | 54 | 54 |
| Pregnant | 175 | 150 | 95 | 140 | 80 | 170‖ | 29 | 6 | 95 | 30 | 30 |
| Nursing | 175 | 195 | 120 | 160 | 115 | 170‖ | 29 | 6 | 110 | 30 | 36 |
| 60 years and over | 150 | 120 | 80 | 140 | 60 | 155 | 22 | 3 | 75 | 30 | 30 |
| Men: | | | | | | | | | | | |
| Sedentary | 140 | 110 | 110 | 150 | 55 | 170 | 29 | 6 | 110 | 42 | 42 |
| Physically active | 160 | 130 | 130 | 170 | 55 | 170 | 29 | 12 | 160 | 54 | 54 |
| With heavy work | 175 | 155 | 205 | 190 | 55 | 180 | 29 | 15 | 305 | 96 | 60 |
| 60 years and over | 150 | 120 | 110 | 140 | 60 | 150 | 22 | 3 | 110 | 36 | 36 |

* Reprinted from Planning Food for Institutions (5).

† These quantities allow for the purchase of some fresh and some canned or frozen vegetables and fruits. During 1 or 2 summer months, it may be possible that all fresh vegetables or fruits may be used, especially if food is produced at the institution. If these have a high percentage of inedible refuse, such as corn on the cob, peas in the pod, or melons, the proportion of total vegetables and fruit usually purchased as canned or frozen can be approximately doubled.

‡ Or its equivalent in cheese, evaporated milk, or dry milk.

¶ Count 1½ lb. bread as 1 lb. flour. Use as much as possible in the form of whole grain, enriched or restored products.

# If you have your own bake shop, quantities for the fat and sugar groups will need to be increased. When baked foods are purchased, some fat and sugar are included in these products.

‖ To meet iron allowance include weekly 1 large or 2 small servings of liver or other organ meats.

TABLE 3

*Nutritive content of diet for child between three and six years of age**

| DAILY FOOD INTAKE | QUANTITY | | MINERALS | | VITAMINS | | | | | FOODSTUFFS | | | CALORIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight | Approximate measure | Calcium | Iron | Vitamin A | Ascorbic acid | Thiamine | Riboflavin | Niacin | Carbohydrate | Protein | Fat | |
| | *gm.* | | *gm.* | *mg.* | *I.U.* | *mg.* | *mg.* | *mg.* | *mg.* | *gm.* | *gm.* | *gm.* | |
| Milk | 960 | 1 qt. | 1.12 | 0.8 | 1640 | 8 | 0.40 | 1.72 | 1.2 | 48 | 34.0 | 36 | 640 |
| Egg | 50 | 1 medium | 0.03 | 1.4 | 495 | — | 0.07 | 0.18 | — | — | 6.5 | 6 | 80 |
| Meat, poultry, or fish, cooked† | 50‖ | 2 oz. raw wt. E.P. | — | 1.7 | 1404 | 1 | 0.14 | 0.19 | 3.0 | — | 11.5 | 7 | 105 |
| Bread, whole-grain or enriched white | 90 | 3 slices | 0.03 | 1.8 | — | — | 0.18 | 0.12 | 1.8 | 45 | 7.5 | 3 | 240 |
| Potato, cooked | 100 | 1 small | 0.01 | 0.7 | 35 | 8 | 0.08 | 0.03 | 1.0 | 19 | 2.0 | — | 85 |
| Vegetable, green or yellow‡ | 100 | 1 serving | 0.10 | 1.4 | 4870 | 23 | 0.05 | 0.17 | 0.6 | 6 | 2.0 | — | 30 |
| Vegetable, other¶ | 100 | 1 serving | 0.03 | 0.4 | 270 | 5 | 0.04 | 0.03 | 0.3 | 6 | 1.5 | — | 30 |
| Fruit, citrus | 100 | 1 serving | 0.02 | 0.4 | 180 | 42 | 0.07 | 0.03 | 0.2 | 11 | 1.0 | — | 50 |
| Fruit, other# | 100 | 1 serving | 0.02 | 0.6 | 161 | 5 | 0.05 | 0.05 | 0.4 | 15 | 1.0 | — | 65 |
| Butter or enriched margarine | 20 | 4 level tsp. | — | — | 640 | — | — | — | — | — | — | 16 | 140 |
| Vitamin D concentrate§ | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total | — | — | 1.36 | 9.2 | 9695 | 92 | 1.08 | 2.52 | 8.5 | 150 | 67.0 | 68 | 1465** |
| Recommended Allowance (2) | — | — | 1.00 | 8.0 | 2500 | 50 | 0.80 | 1.2 | 8.0 | — | 50.0 | — | 1600 |

* Reprinted from the *Handbook of Diet Therapy* (6).

† This evaluation is based on the use of 100 gm. liver, 250 gm. pork or ham, 150 gm. fish, and 500 gm. beef, veal, lamb, or fowl per ten-day period.

‡ The vegetables included in this group are asparagus, broccoli, carrots, green beans, kale, yellow squash, pumpkin, spinach, turnip greens, and other greens.

¶ The vegetables included in this group are tomato—fresh, canned, or juice; vegetables commonly served raw, as celery, cucumber, lettuce, and cabbage; and other cooked vegetables, as beets, eggplant, onions, rutabagas, and cauliflower.

# All fruits except citrus have been included in this average.

‖ Weight after cooking.

§ Sufficient vitamin D will be added to provide 400–800 I.U.

** Additional calories can be provided through the use of sugars and fats.

tional needs. In addition, adaptations might be required to take into account employee schedules and turnover as well as budget problems and available facilities for the preparation of the food.

### PLANNING FOR THE NEEDS OF SPECIAL GROUPS

There are special considerations for children, maternity patients, the mentally ill, tuberculous patients, and the aged. Some of the points at which menu planning is affected for each of these groups will be reviewed in the following discussion.

#### *Planning the Menus in Children's Institutions*

While the nutrition of the child has been improved during the past generation, Jeans recently pointed out (8) that it has not been done to the extent desirable in view of present knowledge. At least three nutritional essentials deserve special emphasis in childhood, namely, vitamin D, protein, and calcium. Vitamin D is required throughout the growth period, a fact extensively overlooked. Protein deficiencies are more common than is generally realized, and meeting needs for calcium and such vitamins as thiamine, riboflavin, and ascorbic acid is elemental.

Several of the aids to menu planning which have been mentioned previously can be applied here. A specific guide to the nutritional needs of infants and children may be found in the Recommended Dietary Allowances (2). The manual, *Planning Food for Institutions* (5) and the *Handbook of Diet Therapy* (6) both contain information on food requirements for children. Examples from these sources are presented in Tables 2 and 3. Of course, the problem of using the type of guide which the employee can understand and interpret safely and easily applies here as well as in the general discussion presented above.

Teaching menu planning for children goes beyond the actual working out of daily menus, since psychologic factors play an important part. Of particular help to the consultant in preparing material for instruction are experimental findings (9–16) dealing with principles of child psychology and information on foods acceptable to children. As Weng (9, 10) has summarized, reducing the incidence of feeding problems plus establishing food habits involves not only teaching food and nutrition but also (a) cultivating an appreciation of the child as a person, (b) acquiring a complete knowledge of the factors that make and affect his appetite, and (c) adopting a critical attitude toward our methods and techniques.

Literature on child feeding which can be given directly to lay personnel is available from the government (17–20). In addition, some state departments of public health and welfare have issued helpful material (21–22). Peterson (23), as a result of making surveys of the need and use of consultation services to children's institutions, has established a "con-

tinued service" mailing list which periodically keeps the institutions informed about timely topics.

The consulting dietitian may also be asked for information on methods and procedures used in equipping and operating an infant formula room. The American Hospital Association has compiled a booklet on procedures and layout for the infant formula room (24). Also a series of articles has been published in this JOURNAL on the effects of heating upon certain heat-labile nutrients of milk (25–28).

### *Menu Planning in Homes for the Aged*

The increasing number of aged persons requires that more thought be directed to their feeding. It is known that caloric requirements of the aged are usually less than those of the young or middle aged (29–32). In some cases, the basic problem in feeding older people is to include within 1500 calories or less a high concentration of proteins, vitamins, and minerals and still give the sweets they like (33). Of the menu planning guides which have been listed, the *Handbook of Diet Therapy* (6) and the manual, *Planning Food for Institutions* (5) are the most adaptable for devising suitable menus for this age group. The latter reference gives monthly quantities of food that will provide for the needs of the "over 60" group.

Experience has shown that the provision of the essentials of a diet for the aged is not so difficult as the motivation to actual consumption. Mechanical difficulties, such as loss of teeth, and various psychologic problems are frequently encountered. To enable persons to eat who have difficulty chewing, it may be necessary to serve chopped and ground food. However, such processing may cause it to lose much of its flavor and palatability, as well as its texture and appearance. While some booklets have been published (34, 35) on this problem, there is need for more practical study of the subject. The Diet Therapy Section of the American Dietetic Association is now devoting some time to such a project.

### *The Menu in Institutions for the Mentally Ill*

Although there is little indication at present that the nutritive requirements for the mentally ill as a group are particularly different from those of normal persons of corresponding body build and age, the feeding of these patients may be difficult (36). Attractive food may serve a therapeutic end with such patients. Hence, it is important to produce a diet which is psychologically satisfying as well as nutritionally adequate. Those who have seen the results of feeding patients who are allowed to make their own choice from an attractively arranged cafeteria realize this is an important part of mental therapy. An appreciation of the critical thinking of the psychiatrists will also help in developing a constructive feeding program (37, 38).

The dietitians who have been successful in feeding the mentally ill emphasize the importance of preparing high-quality food (39), even though it may have to be done against overwhelming odds of meager budgets, inadequate and inefficient personnel, and poor equipment and physical surroundings.

### *Menu Planning in Maternity and Tuberculosis Institutions*

The consultant has quite another problem in teaching the untrained person to plan menus for maternity patients.

Such patients are usually happy to eat. In fact, they enjoy a vacation from menu planning themselves, which is usually accompanied by an interest in new ideas about food. An example of well-planned, adequate menus will help teach these patients how to plan their own and their family's diets adequately. However, it is important that the consultant point out the *additional* requirements of pregnancy and lactation (40–42) and how to meet them.

The tuberculosis hospital also presents a definite problem in nutrition, for food is an important part of the therapy. The general principles of menu planning are the same as for a normal dietary, but more emphasis must be given to tempting the appetite and avoiding monotony. There have been pamphlets issued by organizations emphasizing the basic needs (43, 44). The American Dietetic Association Loan Library has an annotated bibliography available to members (45).

## B. The Use of Food Produced by Institutions

In many of the large penal institutions, mental hospitals, and other institutions located in rural areas, as much food as possible is produced on the land of the institutions. Here the problem is not only one of planning an adequate diet, but it is a matter of producing and processing part of it, as well as budgeting for it.

Source material on this subject is scarce. The experience of Cora Kusner in the use of food produced by an institution is informative. She says (46):

"Our institution produces provisions to the extent of about 46 per cent of our total food costs. This includes the dairy, piggery, chicken ranch, and gardens. Naturally this situation greatly affects our menu planning. It would seem to me that the consulting dietitian must approach this problem much as she would the problem of meal planning for a low-budget farm family, still keeping in mind the necessity of nutritional adequacy. During certain seasons (for instance, when garden tomatoes are at their prime) plentiful produce can be served every day—with cafeteria service and a choice offered, even twice a day. Fresh peas, corn, radishes, green onions, green beans, and many other vegetables are in this same category. This will, of course, vary in different areas. The institution with a garden program and a

low budget uses these products in season far in excess of what would ordinarily be considered good menu planning. This can be done without sacrificing either nutritional adequacy or food satisfaction.

"The average consultant may be able to do little to change institutional policies with regard to production. That usually is a long-range program, slow and difficult even for the dietitian on the spot. She can advise supplementing inadequate production with the purchase of powdered or evaporated milk, dried or frozen eggs, or even fresh products if they are available. The size and location of the institution may govern this.

"With garden produce, sometimes the tendency is to grow excessive quantities of beets, turnips, cabbage, and other vegetables which require the least work and produce the greatest tonnage. The excuse is often lack of help and garden space. The average institutional gardener needs encouragement to produce a variety of items and harvest them in their prime. Too often vegetables as they are delivered to the kitchens would not be acceptable on a general market. If a consultant is aware of these problems, she can work with the superintendent or business manager toward a better production schedule.

"For the small institution without trained supervision, instruction in methods of preserving garden surplus may be important. Sometimes the administration may be encouraged to provide facilities for quick freezing if the desirability of such equipment can be demonstrated."

In stressing the need for an adequate milk supply, Mrs. Kusner points out the importance of knowing the facts regarding pasteurization, bottling, and the desirability of homogenized milk. She also emphasizes the need to know how eggs, meat, and poultry are graded, inspected, and stored.

#### C. Devising Systematic Mechanics for Menu Planning

One of the first routines to establish in creating menu planning procedures is that of actually writing the daily menus in advance. The menu planner should be made to realize the advantages of such a routine: (a) An adequate diet can be achieved only by intelligent, advance planning. (b) Menu appeal is attained by setting up at least several days' menus so they can be compared for variety and insured against monotony. (c) Budget control is dependent upon planned menus which take into consideration the cost and quantity of each food used. Because of its importance, cost control as related to menus will be discussed later in this series.

An encouragement to advance planning is the establishment of a definite time for writing menus. This was found to be very necessary in one survey (47). The habit of planning at a definite time conditions the mind to that task at that time. The interval depends on the length of time menus are planned in advance, which in turn depends on markets, deliveries, storage space, and any other factors peculiar to a given situation. A quiet surrounding is helpful, too, and also, "a little bit of hunger."

That the use of forms for menu planning is useful is evidenced by their wide acceptance. The very fact that there is a ruled blank space for each item of the menu disciplines the menu maker to use it. For the beginner, a space for every item in the menu for a week with a list at the side of the nutritional requirements for the group might help.

The menu form shown in Table 1 emphasizes the use of the pattern dietary as a basis for planning the menu. This provides a guide which will simplify the choices and the menu arrangement for the inexperienced menu planner and at the same time will insure adequacy, provided definite amounts are inserted for each form. A form needs to be devised for each particular institution. The exact procedure now may be a personal one. The rules of starting with the main dishes and proceeding to potatoes and vegetables may be suggested. However, after the planning is finished, the menus should be reviewed for nutritional adequacy, for the "considerations" (consider the person who will eat the food; consider suitability and seasonability of foods; consider money; consider the employees; and consider the equipment), and for day-to-day continuity.

#### D. Sources of Menu Suggestions

But the menu itself isn't planned yet! Sometimes, a blank mind presents itself to a blank sheet of paper. Ideas must come from somewhere. Since the basis of the menu is specific food and the individual recipe, one method of creating ideas is to surround the planner with recipes. There are many sources of this type of material and a library could be built up easily.

Recipe material is available at little or no cost from some departments of the government (48–50). At the state level, the home economics departments of the state universities may have tested quantity recipes for sale (51). The several basic quantity cookery books (52–57) can be reviewed and selected for particular needs. The monthly publications of the restaurant, hotel, and hospital organizations may be made available. In addition, there are the many publications of commercial firms and trade associations which contain excellent suggestions and new tested quantity recipes; these are usually free on request.

As soon as it is possible, a file of recipes for each institution should be compiled, from recipes which have been successful. If old menus are kept in a permanent file with comments written on them as to how they were received or any unusual circumstance, they will provide a good reference source.

A person who plans meals for an institution may frequently lose contact with the local stores and markets unless she does planning and purchasing for her own home as well. The daily paper has commodity market reports in addition to the advertise-

ments of local and chain stores, and the consultant can suggest the use of this source to check seasonability, price, and supply.

On the other hand, many institutions served by a consultant may have on hand unnecessarily large inventories. To move these inventories, the consultant may need to help plan menus which use the foods already on hand.

Several consultants have tabulated simple lists of menu suggestions for use in some localities. If the consultant prepares such lists, they will undoubtedly prove popular, but she must also be prepared to handle a considerable volume of correspondence requesting recipes from institutions which use these lists.

### *Supper Menus*

While the emphasis is always on the total day's meals rather than maintaining specific requirements for each meal, the number of requests and comments concerning supper menus indicates that this topic deserves some special attention. Supper menus have not assumed their proper share of the day's total requirements. No doubt, the lack of personnel for the evening meal, both on an employee and supervisory level, tends to make this planning more difficult. Perhaps some of the recipes developed for the school lunch programs could be used (49, 50, 58–62) for main protein dishes.

The main dishes, often meat substitutes, may be made especially delicious with care in preparation, but without that care they can be extremely unpalatable. Furthermore, the use of accompaniments, such as soups, salads, relishes, hot breads, and desserts, is frequently the point where economy begins. Supper menus require both planning and imagination. This may apply to the lunch menus if the main meal is served at night.

## ACCEPTABILITY

The final test of menu planning is in its ultimate satisfaction to the consumer or, as the term is now used, in its acceptability (63). Unless that nutritionally adequate menu is prepared to preserve the essential nutrients, and unless that menu is so well liked by the majority of the persons it is planned for that the food is consumed, the menu planning is not successful. It is hoped that the menu planner enjoys food herself, since attitudes are reflected in one's menus. Some general references (64–70) are listed which could be used for developing a menu appreciation in an interested employee. These references also emphasize well planned, attractive menus in relation to local food habits, and point out the importance of introducing new foods gradually, in conjunction with popular, familiar foods.

The person who plans the menus needs to hear or overhear the comments of the persons being fed. The consultant, too, should be aware of the general reaction to the meals being served. Her contacts with administrative personnel will be helpful in obtaining this reaction. Then, continued progress in overall menu planning techniques is largely contingent upon adequate translation of problems as they develop. The consultant, by her encouragement and ability to interpret situations, is a strong ally in raising food service standards for institutions without dietitians.

EDITORS' NOTE. Succeeding papers in this series will cover the following topics: Food Preparation, Storage, and Waste; Sanitation; Layout and Equipment; Food Cost Control; and Employee Training.

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# Relation of Price to Food Selection[1]

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NUTRITIONAL surveys have shown that many deficiencies in student dietaries may be associated with faulty selection, rather than with inadequate purchasing power. Consequently research workers are attempting to discover means of improving student food selection. The school cafeteria offers several possibilities, and the price mechanism appears to be one feasible means of influencing food selection. Certainly economic doctrine suggests that if student incomes, tastes, and the prices of all food items but one remain constant, a downward fluctuation of the price of that item will result in an increase of sales, while conversely, an increase in price will result in a decrease of purchases. However, such broad generalizations can never specify, for any particular cafeteria, whether the student population will either increase or decrease its purchases sufficiently to justify an administrative price change for any single item. Empirical studies are needed to furnish data with which to implement such theories before they become realistic for any given market, or for any one item within the market.

The use of controlled experimentation is common in most sciences, but it is limited in its application in social science research. Difficulties encountered in the maintenance of rigorous controls primarily explain why this method is adopted so infrequently by social scientists. The author considered this technique applicable to the present study because the school cafeteria appeared to offer a "human laboratory" where adequate controls could be maintained,[2] while experimenting with a popular dessert, white cake; a popular vegetable, string beans; and an unpopular vegetable, beets.

## EXPERIMENTAL PROCEDURE

Two field studies were conducted to discover whether the price mechanism could be adopted by the nutritionist as a means of directing student food choices. One study was made in the Lincoln and Roosevelt High Schools of Des Moines in the fall of 1948, during which the elasticity of demand for white cake was studied. The second study was conducted in the fall of 1949 in Marshalltown, where the variables were beets and string beans. In both studies customary menus were served a stipulated number of times at their usual prices, and then were repeated with the prices remaining constant for all but one item. In Des Moines there were three observation days at one price, two for the second, and one for the third. In Marshalltown, there were two days at each of three prices for both beets and string beans.

When the observations were plotted[3], scatter diagrams were obtained which indicated the nature of the relationship between the prices charged and the quantities of the experimental food purchased. The data were such that the least squares method was used to fit straight line demand functions.

## RESULTS

In Des Moines, where white cake was used as the variable in the Lincoln and Roosevelt High Schools, the demand function was found to be[4]: $D = 57.16 - 4.383p$. Thus, if the price were 8 cents, D would equal $57.16 - 4.383 \times 8$, or 22.1 per cent, the proportion of the sample which would buy cake at this price. The standard error of the estimate was 2.4 per cent. The coefficient of correlation was 0.9 and was significant. In Table 1 are presented the elasticities of demand for the quantities which are estimated will be taken at 8, 9, and 10 cents respectively. The elas-

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[2] Difficulties were encountered during the observation periods which indicated there there would be limitations of this particular experimental method if adopted for analyzing the ordinary public school lunch program. A school, financed for the purpose of educational experimentation, would be more adaptable for this type of analysis.

[3] The Y axis represented the per cent of the sample or population which selected the food, and the X axis symbolized the price charged for the item.

[4] "D" equals the per cent of the sample (239 students) who selected cake; "p" symbolizes the price per slice of cake which was charged.

TABLE 1

*Elasticity of demand for white cake as price per serving varied*

| POPULATION CHOOSING WHITE CAKE | PRICE PER SERVING | ELASTICITY OF DEMAND |
|---|---|---|
| % | *cents* | |
| 22.1 | 8 | −1.6 |
| 17.7 | 9 | −2.2 |
| 13.3 | 10 | −3.3 |

TABLE 2

*Elasticity of demand for beets and string beans as price per serving varied*

| POPULATION CHOOSING FOOD VARIABLE | PRICE PER SERVING | ELASTICITY OF DEMAND |
|---|---|---|
| Beets | | |
| % | *cents* | |
| 5.89 | 2 | −0.06 |
| 5.73 | 3 | −0.09 |
| 5.56 | 4 | −0.12 |
| 5.39 | 5 | −0.16 |
| String Beans | | |
| 16.6 | 2 | −0.21 |
| 14.9 | 3 | −0.34 |
| 13.2 | 4 | −0.51 |
| 11.5 | 5 | −0.74 |

ticity of demand equals the per cent change in quantity which may result with a 1 per cent change in price, everything else being equal. Thus, if the elasticity of demand is −2.2, this means that a 1 per cent change in price will be associated with a 2.2 per cent change in quantity. If the price movement is upward, the quantity change will be downward, and conversely, if the price shift is downward, the quantity selected will increase. The quantities are expressed in terms of the per cent of the sample who chose white cake at these respective prices.

### *Vegetables*

In Marshalltown, observations were made from the entire school cafeteria population[5], using beets and string beans as the experimental variables.

The least squares demand function for beets was determined to be: $D = 6.2 - 0.167p$. The coefficient of correlation was .84 and was found to be significant. Such a correlation suggests that increased purchases may be associated with the price drop. However this correlation does not necessarily suggest what the magnitude of the change in purchases will be, and hence, the low elasticities of demand for beets are not inconsistent with the relatively high coefficient of correlation. The standard error of estimate was 0.16 per cent.

In Table 2 are given the elasticities of demand for both beets and string beans.

[5] The daily average was 290 patrons.

In the case of string beans, the demand function was found to be: $D = 20.04 - 1.71p$. The coefficient of correlation was 0.61, and it was found to be not significant. The standard error of estimate was 3.5 per cent.

## DISCUSSION

The number of observations upon which these estimates are based was limited to six days in each case. Because of the limited scope of this study, the results are to be interpreted with caution. Observations made in three high schools do not guarantee a representative picture of all high schools in Iowa. In addition, the functions determined pertain only to particular menus. If string beans had been served with chicken stew as the meat dish, instead of with beef and noodles, the function for string beans might have a different form. Nevertheless, these observations do imply certain factors which may also apply to the school lunch program as a whole.

It may be found that other unpopular vegetables (in addition to beets) will not respond to price changes sufficiently to justify administrative price manipulation. In the case of beets, when the price was dropped from 5 cents to 4 cents per serving, the per cent of the student population taking beets increased by 2.4 per cent. If 300 students had passed through the cafeteria line, there would be one more sale at 4 cents than there would have been at 5 cents.

Two implications are suggested in the example of more popular vegetables such as string beans. A lowered price will attract some increased purchases, but probably not enough to justify a price drop, from the aspects of cafeteria business administration. For instance, a price drop of 20 per cent, from 5 cents to 4 cents, will result, approximately, in a 10 per cent increase in sales, or about 6 additional sales, providing the student population numbers 300. However, a more important implication concerns the results of a price increase. An increase in price above 6 cents will result in a significant decrease in the quantity sold. At 6 cents, the elasticity of demand is −1.0. This means that if the price is raised 33.3 per cent to 8 cents, the corresponding decline in the per cent of the population purchasing string beans would be 33.3 per cent. If the student population were 300, then the sales would drop from 29 at 6 cents to 19 at 8 cents.

The great elasticity of demand of white cake indicates that the price mechanism may be used to curtail purchases. If other pastry items should have similar elasticities, then the price mechanism could be used effectively to decrease their purchase, and thus indirectly to stimulate the sales of other items such as fresh fruit, custards, or ice cream. At 8 cents the elasticity of demand is −1.6. If the price is increased by 12.5 per cent to 9 cents, there will be a 20 per cent decline in the per cent of the population taking cake, or 13 sales.

# Nutritional Status Survey, Groton Township, New York

## I. The Dietitian and Surveys: Description of the Sample[1]

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DURING the last decade and a half there has been an increasing number of nutritional surveys. Since surveys are expensive in time, money, and personnel, the dietitian and others may well raise the question: "Why do surveys?"

When properly conducted, surveys have meaning to all individuals concerned with human nutrition programs. A good study is useful in defining nutritional problems. Definition of the problem forms the basis for any corrective and/or preventive measures which may be advisable.

In the period from 1935 to 1945 there was considerable concern over poor nutrition in this country. This concern grew out of findings of dietary and nutritional surveys conducted primarily in the thirties under economic conditions quite different from those which exist today. It becomes important to know whether the findings reported at that time still hold true in this era of relative economic prosperity. In the meantime certain changes in attitude have occurred regarding the significance of some of the indices used in an attempt to measure nutritional status which may influence the interpretation of findings.

It is important to all interested in better human nutrition that there not be an exaggerated emphasis on the existence of widespread nutritional inadequacies unless these problems truly exist at the present time. Otherwise, nutritionists may lose the confidence of the public at large and the medical profession in particular for crying "wolf, wolf" when there is no wolf. It is particularly important to the dietitian and the nutritionist that nutrition not fall into ill repute. Certainly on the basis of their clinical experience they are prepared to defend the fact that there are many individuals whom better feeding can help. Perhaps there should be a concentration on these individual problems until better up-to-date survey evidence is available.

These remarks should in no way be construed to indicate that there is not a need for nutrition education. Rather, as a result of good up-to-date survey information, we may know whether there should be a shift away from attempts at mass education by throwing up the bogey man, to an attempt to help *individuals* who, despite good economic circumstances, still may be poorly nourished.

The dietitian should be well versed in methods of attempting to evaluate nutritional status so that she may be in a position to interpret findings of surveys critically. In reading and in using data, the dietitian may well keep two questions uppermost in her mind: first, are the methods employed in the survey, including the sampling, appropriate to the objective of the investigator and second, is the use and interpretation which the dietitian wishes to make of the data appropriate considering the objective and the methodology (especially sampling) used in the study? Perusal of the recent report of the National Research Council, *Nutrition Surveys: Their Techniques and Values* (1) as well as the forthcoming Symposium on Nutritional Appraisal of Human Subjects (2) will help the dietitian to have a basis for this critical interpretation of findings.

Several methods have been used in an attempt to evaluate nutritional status on a survey basis. None is at present ideal. In reading data from nutritional surveys, it is exceedingly important for the dietitian to realize that the present techniques are tentative and that they are greatly in need of evaluation, especially insofar as information on essentially normal people is concerned. She should bear in mind, too, that it is exceedingly important in all reports of survey data that adequate description be given of

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[2] The authors wish to express their appreciation to Herrell F. DeGraff of the Department of Agricultural Economics, College of Agriculture, Cornell University, for his guidance and advice in the conduct of the socio-economic aspects of this survey.

the sampling and other procedures used. Only by knowing these can one know what interpretation is justified from the data at hand.

The study to be reported in this and succeeding papers will be used to illustrate the methods in use in surveys at the present time—what may be expected from them, their strengths and weaknesses. In this first paper we propose to give the overall set-up of the survey and a description of the sample studied. Without the latter information, data to be reported later have little meaning. In subsequent papers, findings relative to family and individual food intake; blood levels of nutrients; physical findings; interrelationship of these data; and the relation of socio-economic factors will be presented.

## OBJECTIVE

Earlier studies in New York State (3) indicated that children in communities under 2500 have less adequate diets than those from larger areas. These findings led to the decision for the School of Nutrition in cooperation with the State of New York Department of Health to study in an intensive manner, on a family and community-wide basis, at two different seasons of the year, the food usage and the nutritional status of families in a rural area in relation to socio-economic status. It was proposed to choose an area which included one or more small villages and some good and poor agricultural land with rural farm and rural non-farm families.

The area selected for study was Groton Township, lying in the northeast corner of Tompkins County in South-Central New York. The township, with a population of 3879 (4), is essentially rural in character. About one-half of the population, 2087, live in the village of Groton. The village has one large industry, a typewriter plant; hence the area has a combination of agriculture and industry which gives a broad occupational and residential cross-section. Agriculturally the township is predominantly a dairy region with the majority of farm land judged of sufficient quality to support a profitable farm business.

## METHOD

### *Community Organization*

The organization of the community for the study proved to be stimulating and full of human interest. Clearance was made in late September, 1948, with local professional personnel in public health, extension, and education. Medical approval was obtained by the medical director of the project through letters to local physicians and through the local medical society. Helpful contacts with the mayor and town supervisor preceded a mass meeting with local organization leaders at which time the project was outlined and questions answered.

Following the meeting, as names for the sample were selected, individual letters were sent to each prospective cooperator outlining the project, and indicating that a nutritionist would call to give further information and solicit cooperation. At the same time, radio and press releases concerning the work were sent out through channels which previous investigation had indicated to be the most effective in the community. The local paper, throughout the entire study, carried weekly reviews of progress. The publicity saved time for the nutritionist and simplified interviews.

### *Selection of Sample*

It is important to know the method of sampling used, since the representativeness and randomness of the sample determine what use may be made ultimately of the data.

The selection of the sample for this study was based on a list compiled from two sources: the school census and the voter's registration books. The school census contained a listing of all families in the township with children from one month to eighteen years of age. To expand this list to include families without children or with all children over eighteen years of age, the voter's registration was used. Originally it was hoped that 100 complete and usable survey records might be obtained from each of three residential classifications—farm, rural non-farm, and village. A family was classified as "farm" if the farm business was large enough to provide a full-time job for at least one man. "Village" families were those living within the boundaries of the village of Groton. "Rural non-farm" families were those living outside the village of Groton but having no farm enterprise or only a small operation.

The combined school census and voter's registration list was divided into three parts according to the above residential categories and alphabetized. Since there were only 125 farm families, selection of the farm sample amounted merely to the sending of letters inviting cooperation of all the farm families listed. For other categories, every tenth name among the village and every sixth name among the rural non-farm groups were selected. When the possibilities of cooperation from this sampling were exhausted, the list was extended in a similar manner.

### *Dietary Studies*

The dietary studies consisted of two parts: a family food record kept for one-week periods in the fall and spring and individual 24-hr. food records kept for one mid-week day by each cooperating individual in the fall only. The family food records included an inventory of food on hand at the beginning and at the end of the record period, together with all food usage during the week. No attempt was made to estimate waste. Food was recorded in terms of quantities, form, source, and cost. In the case of home-grown food, a value was assigned later on the basis of current retail prices. In addition, information

was obtained concerning the individuals fed from the food supply, their ages, the number of meals each had at home or lunches carried from home during the recording week; and the number of meals taken in restaurants, school, or some other place not using the home food supply. A notation was included of any food and/or nutrition training to which the homemaker had been exposed. In general, records were initiated in the presence of the nutritionist who contacted the family once, twice, or, in some cases as often as seemed necessary, during the week. At the end of the week, the nutritionist picked up the record and checked it with the homemaker. The presentation of the methods of analysis of records will be deferred to a later paper.

*Blood Studies and Medical Inspection*

Immediately after the completion of the dietary studies, individual families appeared by appointment at a clinic set up in the Town Hall of Groton. At the rate of 50 to 100 individuals per evening, chest X-rays, medical inspections, and blood samples were taken. Several drops of capillary blood were taken by finger prick from each individual for analysis for vitamin A, carotene, ascorbic acid, serum protein, hemoglobin, alkaline phosphatase, and riboflavin according to the micro-techniques of Bessey and Lowry (5). Two blood teams worked at each session. Medical inspections were made by a team of five physicians working three per clinic. In addition to a medical inspection for signs of nutritional inadequacy, a brief medical history, height, weight, blood pressure reading, and chest X-ray were obtained for each participant. The form used in checking for signs of nutritional inadequacy was one adapted from the U. S. Public Health Service (6). Both blood studies and medical inspection for children under five years of age was optional. Dietary information, however, covered all members of the family.

*Socio-Economic Studies*

Information concerning socio-economic status was obtained to determine what effect, if any, these factors might have on food usage and nutritional status. Information was gathered concerning age, education, nationality background, occupation, income, household conveniences, and home-produced food. These inquiries were made by two agricultural economists who called on families at their homes during the five- to six-month period between fall and spring nutritional observations.

*Cooperation Obtained*

One of the primary purposes for undertaking the survey was to test the practicality and usefulness of a concentrated study on a small representative group and to see what type of cooperation might be received in a study which involved considerable time and effort on a family-wide basis. Approximately 40 per cent of the families whose names were drawn cooperated in the fall portion of the study. An additional 30 per cent did not cooperate due to circumstances which made it impossible for them to do so; the remaining 30 per cent were refusals for miscellaneous reasons. Of all contacts made, only three expressed any antagonism.

It is interesting to note that, using estimates calculated from census data for 1940 and 1945, the families cooperating represent approximately 35 per cent of the commercial farm families in the township; 30 per cent of the rural resident families; 20 per cent of the village families, and 25 per cent of all families in the township. Whether the final sample is a truly representative cross-section of the population of the township is open to question. The method of selection of necessity made the sample non-representative insofar as getting identical percentages from the total families in each residential grouping into the sample. Within each of the three groupings one can only assume that the sampling procedure employed and the willingness of individual families to cooperate resulted in a representative sample in these instances. Certainly there was a broad range of economic and social background within each classification, as will be apparent in later examination of results. Observation at the evening clinic sessions did much to convince one that he was not dealing only with the privileged.

There was considerable advance speculation concerning how many families would cooperate again in the spring, particularly after the detailed socio-economic inquiries. Approximately 80 per cent of the fall participants cooperated again in the spring. An additional 10 per cent had indisputable reasons which made recooperation impossible. The remaining 10 per cent refused to cooperate.

*Responsibility to Cooperators*

The question always arises in studies such as this as to the researcher's responsibility to the participating families. From the beginning, it was the policy to be perfectly frank with the cooperators as to what would be required of them. They were promised that for their own family group they might have any of the results which they wished. The community as a whole could have the results as a whole to use in any way which it wished, but no information on individual families would be given anyone but the family concerned. At the time of medical inspections, each family was asked to designate his family physician who would be informed of any medical abnormalities uncovered. However, if the family preferred, the medical director of the project would inform the family itself of the abnormality. Of course, no treatment would be given by the latter. At the completion of the analysis of the dietary material, individual letters were sent to each family giving an evaluation of its food usage. If any homemaker wished advice

or assistance in dietary planning, she had been informed that the public health nutritionist of the school staff, operating as a member of the County Health Unit, would be happy to help her. Several requests of this nature were received and answered.

## DESCRIPTION OF THE SAMPLE

A description of the characteristics of the sample with which one is dealing is a prerequisite to any practical interpretation of findings. In Table 1 is presented the number of families and individuals studied in the fall and spring from each residential category.

### *Size of Families and Age and Sex Distribution by Residential Type*

The farm family, on the average, was somewhat larger than that in the rural non-farm and village categories. The average number of persons in the household on the farm was 4.20; in the rural non-farm, 3.58; and 3.54 persons per family in the village. Also, the proportion of large families was greater on the farms. Approximately 40 per cent of the farm families included five or more persons. This was true of only 20 per cent of the rural non-farm families and 25 per cent of the village families.

To provide a measure of family size as related to the economic aspects of food needs, family size was calculated in terms of food expenditure units (7). Both in the fall and spring about 18 per cent of the families comprised less than two units; 54 per cent had two but less than four; the remaining 28 per cent had four or more units.

Both in the fall and spring for all residential categories there was a slight predominance of male subjects and the average age in years was approximately twenty-eight years. In the entire sample, about 25 per cent of the individuals were under ten years of age; approximately 15 per cent from ten through twenty years; 30 per cent in the twenty-to-forty-year range, with 10 per cent each in the fourth and fifth decades of life. Approximately 10 per cent of the individuals were over sixty years of age, with several of these beyond eighty.

### *Facilities and Tenure on Home*

Data concerning household conveniences reflect the favorable economic conditions in the community at the time of study. Of the 223 families all but one family (rural non-farm) had radios, and all but two families (rural non-farm) had electricity. Ninety-four per cent had running water; about 87 per cent had telephones, automobiles, and bathrooms; 79 per cent had furnaces; and the same percentage owned their own homes. In most instances, the rural non-farm group fared somewhat less well, largely a reflection of lower average income. The village group included a smaller percentage owning their own homes and automobiles.

TABLE 1

*Families and individuals cooperating in the study*

| SEASON | VILLAGE | | RURAL, NON-FARM | | FARM | | TOTAL | |
|---|---|---|---|---|---|---|---|---|
| | Families | Individuals | Families | Individuals | Families | Individuals | Families | Individuals |
| Fall | 103 | 371 | 74 | 269 | 46 | 199 | 223 | 839 |
| Spring | 81 | 277 | 59 | 177 | 35 | 119 | 175 | 573 |

TABLE 2

*Educational attainments of adult males and females*

| EDUCATIONAL ATTAINMENT | MALES | | | | FEMALES | | | |
|---|---|---|---|---|---|---|---|---|
| | Farm | Rural, non-farm | Village | Total | Farm | Rural, non-farm | Village | Total |
| | % | % | % | % | % | % | % | % |
| Grade school | 32.1 | 29.6 | 9.7 | 21.5 | 14.6 | 19.7 | 10.3 | 14.1 |
| High school | 50.9 | 58.0 | 72.8 | 62.9 | 54.2 | 55.3 | 60.7 | 57.7 |
| College | 17.0 | 12.3 | 17.5 | 15.6 | 31.2 | 25.0 | 29.1 | 28.2 |

### *Education of Husband and Wife*

In Table 2 it is shown that the adult female population had more formal schooling than the adult males. This relationship held, too, for wives as compared to their husbands. The percentage of women with only a grade school education is one-half that of men; the percentage of women with college training almost twice as great as that of men. The village group had the highest level of educational attainment.

### *Nutritional Education of Wife*

One-half of the homemakers had not studied about food or nutrition. About one-fifth listed high school as their source of knowledge; about one-tenth recorded a college home economics or health course. Fifteen per cent cited Home Bureau or 4-H club work as their source of information.

### *Nationality*

Information was gathered concerning the country of birth of each husband and wife and the birthplace of their parents, since cultural food patterns are known to vary widely. The survey showed, however, that nationality influences probably were not a significant factor in Groton Township. In less than 4 per cent of the cases was either husband or wife foreign born; this figure compares closely with the 1940 census for the township which showed 3.8 per cent of the total population to be foreign born. In only 12.7 per cent of the families had a grandparent been foreign born.

### *Occupation*

Farming and manufacturing were the principal occupations in the community, involving approxi-

mately 70 per cent of the heads of households. An additional 15 per cent were employed in trades or transportation and communication, with about 8 per cent in the professional or executive class. The remaining 7 per cent fell into the clerical, domestic service, public service, and school categories.

From another tabulation it was apparent that the proportion of homemakers working outside the home was greatest among the village families. About one-fourth of the village homemakers were employed away from home, compared to only one-sixth of those in the rural non-farm group and only one wife in the farm group. Approximately the same percentage of contacts in each residential category gave employment of the homemakers as the reason for not cooperating.

### *Income*

Usable income information was obtained from about 91 per cent of the families. The income data on village families represent a total of cash earnings of all family members, before taxes or deductions, plus income from any other sources, such as insurance, pensions, rent, and dividends. Farm incomes were more approximate and represent farm income plus income from other sources. The farm income was calculated on the basis of acreage and yield of crops, the number of livestock, and the yield of milk and eggs. Rural non-farm incomes were calculated by a method combining certain features of the two methods used for farm and for village families.

The average annual income per family was approximately $4724. This seems like a high figure. However, when figured on a per capita basis, there being an average of 3.69 persons per family studied, the average per capita income is $1280. This figure was $169 under the $1449 per capita personal income before taxes reported in 1948 for the United States as a whole (8). The median income per capita in the Groton sample was slightly lower, $1191. Only 5 per cent of the families had incomes under $2000 per year. Nearly three-fourths had incomes in the $2000 to $6000 range, with only 3 per cent having incomes in excess of $10,000.

The rural non-farm families clearly had incomes lower than village or farm families, whether considered on an average or median basis. The average weekly income for rural non-farm families was $73.12 compared with $108.48 for farm and $96.35 for village families. The overall average for all families was $90.83. When the median weekly income is considered, eliminating the distorting effect on averages of the very high incomes, the rural non-farm group was still lowest at $70.00, but the village median of $93.64 was slightly higher than the farm group at $90.00. The overall median income was $84.50 per family per week. Approximately 18 per cent of the rural non-farm and 13 per cent of the farm families had incomes of less than $50 per week, while only 3 per cent of the village families fell into this category.

A more meaningful expression of income for our present purpose is in terms of weekly income per food expenditure unit. The larger farm family size brings the average farm family weekly income per food expenditure unit $27.83, down closer to that of the rural non-farm group, $23.97. The village families had an even more favorable position, $33.76.

SUMMARY

The scope and methodology of a survey, conducted at two seasons of the year, of the food usage and nutritional status of families in a rural area in relation to socio-economic status are described. The socio-economic characteristics of the sample of 223 farm, rural non-farm, and village families involving 837 individuals in the fall; and 175 families involving 573 people in the spring, are given.

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### *Saving Oven Space*

Sometimes lack of oven space handicaps food production. Some dishes, however, need not be baked. Macaroni and cheese, for instance, can be made in a double boiler by adding cooked macaroni to cheese sauce. After this mixture has been spread out in baking pans, browned buttered crumbs or crushed cereal may be spread over the top, or they may be browned under the broiler after they are sprinkled over the macaroni.—*Alice M. Easton, Food Consultant, H. A. Johnson Company, Boston.*

# Nutritional Status Survey, Groton Township, New York

## II. Nutrient Usage of Families and Individuals[1]

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IN A previous paper the plan and sample for a nutritional status survey in a rural community in South-Central New York State were described (1). In examining the findings we turn first to a consideration of the dietary study portion of the survey. Though dietary studies in no way measure nutritional status as such, they do give certain presumptive evidence and form a basis for any corrective program which might be undertaken as a result of the nutritional survey. In the present study the prime interest was in family food usage in relation to nutritional status, as measured by blood analyses and physical findings, and in relation to socio-economic factors. A small amount of information was obtained on individual food intakes which might be viewed with reservations in terms of the nutritional status measurements. In this paper will be presented the food usage of families and of individuals in terms of nutrients available. Succeeding papers will be devoted to an examination of the relation of certain socio-economic factors to food usage in terms of nutrients and of the various food groups. Later, information from the blood analyses and medical inspections, and the interrelationships between food usage and these findings, will be presented.

### FAMILY FOOD RECORDS

Collection of family food records for the fall period began about the first week in October and extended until just before Thanksgiving week. Spring records were collected after the Lenten period between the third week in April and the second week in May in accordance with the method previously described (1).

Analysis of family food records was made in large part by nutritionists of the project. Each family was classified by family type; numbers of the family were converted to equivalent food expenditure units[3] (2) and to equivalent nutrition units[4]. The occupations and activities of the family members were considered in evaluating for energy units. In addition, total meal equivalents at home and household size in terms of person-week equivalents were calculated for each family (3). Food records were then checked for amounts and prices. Total consumption of each food type was summarized in terms of weight in pounds and total dollar value. From the summary, the nutritive value of the record was calculated using the food values given by the Bureau of Human Nutrition and Home Economics (4) supplemented by values from Bowes and Church (5). Nutrients available for consumption per nutrition unit per day were calculated for each family.

#### *Average Availability of Nine Nutrients by Residence and by Season*

In Table 1 is presented the average availability of the nine nutrients in the family food records as related to farm, rural non-farm, or village residence in the fall and in the spring. The overall picture was one of adequacy for every nutrient with the possible

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[3] The food expenditure unit is a measure developed by the Bureau of Human Nutrition and Home Economics, United States Department of Agriculture, to compare the money value of food among families differing in size and age composition. A food expenditure unit is the money value of the food of a moderately active man; figures for persons of other ages, sex, and activity are expressed in terms of ratios to this value.

[4] The nutrition unit is a measure developed by the Bureau of Human Nutrition and Home Economics to compare nutrient intakes of families differing in size and age composition. A nutrition unit represents the nutrient needs of the physically active man, based on the 1948 revision of the Recommended Dietary Allowances (6). The nutritive needs of persons of other ages, sex, and activity are related to those of the physically active man.

TABLE 1

*Average availability of nine nutrients in fall and spring as related to type of residence*

| TYPE OF RESIDENCE | NUMBER OF FAMILIES | NUTRIENT AVAILABILITY PER NUTRITION UNIT PER DAY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Energy | Protein | Calcium | Iron | Vitamin A | Thiamine | Riboflavin | Niacin | Ascorbic acid |
| **Fall** | | | | | | | | | | |
| | | *calories* | *gm.* | *mg.* | *mg.* | *I. U.* | *mg.* | *mg.* | *mg.* | *mg.* |
| Farm | 46 | 3518 | 109.0 | 1274 | 18.8 | 12,941 | 2.38 | 3.03 | 23.5 | 145 |
| Rural, non-farm | 73 | 3544 | 95.8 | 1005 | 17.3 | 9,864 | 2.13 | 2.42 | 21.8 | 133 |
| Village | 102 | 3011 | 85.8 | 916 | 14.7 | 9,734 | 1.89 | 2.18 | 18.9 | 124 |
| All families | 221 | 3292 | 94.0 | 1023 | 16.4 | 10,445 | 2.07 | 2.44 | 20.8 | 131 |
| **Spring** | | | | | | | | | | |
| Farm | 35 | 3376 | 104.4 | 1207 | 18.2 | 9,611 | 2.29 | 2.84 | 22.9 | 125 |
| Rural, non-farm | 59 | 3594 | 101.5 | 996 | 18.5 | 7,915 | 2.34 | 2.63 | 23.6 | 141 |
| Village | 81 | 3252 | 88.3 | 902 | 14.9 | 7,043 | 1.99 | 2.22 | 20.1 | 129 |
| All families | 175 | 3392 | 96.0 | 995 | 16.8 | 7,851 | 2.17 | 2.48 | 21.8 | 132 |

exception of calcium. The village group in the fall, and the village and rural non-farm group in the spring were slightly below the 1-gm. recommendation. These figures make no allowance for waste or for cooking losses (1). However, except for calcium, there seemed to be a reasonably comfortable margin.

For all nutrients the village group was consistently in the least favorable position, followed by the rural, non-farm group, with the farm group occupying the most favorable position. There seemed to be no essential differences in average intakes fall and spring, except in the case of vitamin A value. Here, in every residential group, the vitamin A value available in the spring was substantially under that available in the fall. This was a reflection of the lower usage of green and yellow vegetables in the late spring. It is interesting to note that in general ascorbic acid intake did not appear to fall over the winter months.

A comparison of the average nutrients available per nutrition unit per day reported in this study with the findings of the Bureau of Human Nutrition and Home Economics in its study at approximately the same time (winter 1948) of about 250 families in each of four cities (Buffalo, Birmingham, Minneapolis-St. Paul, and San Francisco) (3) is of interest. In spite of the fact that food not eaten by household members was substracted in the Bureau tabulations for all but one nutrient in one city, the average nutritive values were considerably in excess of the values reported here. The Bureau studies were based on the food list method.

### *Families Failing to Meet Recommended Dietary Allowances*

Realizing that averages do not always tell the whole story, it is informative to see what percentage of families failed to meet the National Research Council's Recommended Dietary Allowances (6) per nutrition unit per day. In Table 2 is presented this information by residential group for both fall and spring. In interpreting the data, it is well to remember the nature of this widely used yardstick—that allowances represent "normally desirable goals or objectives" rather than "merely the literal (minimal) requirements of average individuals" (6). The big unanswered problem is to know what level of failure to meet the allowances is critical. Certain it is that mere failure to meet allowances fully for all nutrients is not synonymous with a serious dietary limitation.

In general the picture given in Table 2 is the same as that presented by the averages. Perhaps the greatest difference is the percentage of families who did not meet the recommended caloric allowances. From the distribution figures (not presented here), it is true that for most nutrients the greater percentage of families who were below the allowances were not markedly below. However, there were a few families who, in spite of favorable economic circumstances, had definitely low amounts of nutrients available. Availability of calcium was the point of greatest weakness. For this nutrient, over half the families both in the fall and in the spring had usages under 1 gm. per nutrition unit per day. The village group was in much the least favorable position. However, only 2 per cent of the families in the fall and 4 per cent in the spring had less than $\frac{1}{2}$ gm. calcium available per day.

An attempt was made to evaluate the records on a cooked food basis by making the conservative corrections of 20 per cent in thiamine and niacin values and 25 per cent in ascorbic acid values. With this adjustment, the percentage of families who failed to meet the allowances increased by threefold for thiamine and ascorbic acid and by nearly fourfold for

TABLE 2

*Percentage of families failing to meet Recommended Dietary Allowances (6) per nutrition unit*

| NUTRIENT | ALLOWANCE PER NUTRITION UNIT | FAMILIES BELOW ALLOWANCES PER NUTRITION UNIT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Farm | | Rural, non-farm | | Village | | Total | |
| | | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring |
| | | % | % | % | % | % | % | % | % |
| Calories | 3000 | 30 | 40 | 22 | 36 | 51 | 42 | 37 | 39 |
| Protein | 70 gm. | 9 | 9 | 15 | 8 | 16 | 17 | 14 | 13 |
| Calcium | 1000 mg. | 22 | 29 | 53 | 54 | 66 | 69 | 52 | 56 |
| Iron | 12 mg. | 4 | 9 | 9 | 15 | 25 | 20 | 16 | 16 |
| Vitamin A | 5000 I.U. | 9 | 17 | 16 | 29 | 12 | 37 | 12 | 30 |
| Thiamine | 1.5 mg. | 6 | 6 | 15 | 8 | 19 | 17 | 15 | 12 |
| Riboflavin | 1.8 mg. | 4 | 6 | 16 | 10 | 24 | 17 | 17 | 13 |
| Niacin | 15 mg. | 9 | 6 | 8 | 7 | 16 | 15 | 12 | 10 |
| Ascorbic acid | 75 mg. | 6 | 11 | 8 | 10 | 14 | 15 | 10 | 13 |

niacin. No attempt at correction was made for other nutrients.

It is interesting to know whether or not the same families failed to meet the allowances for each nutrient. As a means of getting at this point, the number and percentage of families who met the allowances in full in regard to varying numbers of nutrients were tabulated. Without considering cooking losses, about one-third of the families, both in the fall and the spring, fully met the allowances for all nine nutrients; an additional one-fourth were below the allowance in respect to only one nutrient. Only 1 per cent of the families at either season failed to meet the allowances for all of the nine nutrients, with only slightly higher percentages failing in respect to five, six, seven, and eight nutrients respectively. Since in Table 2 we see that usually there were at least 10 to 15 per cent of the families below the allowances for each nutrient, it would seem that any possible inadequacies present are not due to any single small group of families.

## INDIVIDUAL FOOD RECORDS

In order to get some idea of how the family food supply was distributed among individual family members, the homemaker was asked to see that the food consumption of each family member was recorded for a single 24-hr. period during the same week as the family food record. It was suggested that a "typical" mid-week day be used. The individual record form and the instruction to the person recording his diet were adapted from those of the Nutrition Section of the U. S. Public Health Service (7). Individual records were collected in the fall for 805 individuals. They were not repeated in the spring in order to simplify matters for the homemaker.

The weakness of a one-day record is recognized, and further it is realized that in all probability the day of recording represents the best intake of the individual for the week. Individual food records were calculated in terms of actual nutrients by the "shortened long method" of Babcock, soon to be published (8). Babcock has shown this method to give results within 4 per cent of those obtained when applying the conventional long method of analysis. His tables at the time were based on the figures in the U. S. Public Health Service table (9). It will be remembered that these tables take cooking losses into account. Also the individual records are in terms of food actually eaten and not food available for consumption, as in the case of the family records.

### *Average Intakes of Nutrients by Sex and Age Groups*

In Table 3 is presented the average intake of nutrients by sex and age group. In general, the individual records reflected the same good dietary intake that was found for the families. However, it becomes apparent that even the averages for individuals, by sex and age, give somewhat more information than family records. Within an adequate family record, it is quite possible to find individual family members whose food intake was less than desirable. In fact, of the seventy-seven families whose average nutrient usage per nutrition unit fully met the allowances, in only four did each family member fully meet his Recommended Dietary Allowances. Of the 105 families whose calcium usage per nutrition unit met the allowances, in only seventeen did all the individuals in the family groups have calcium intakes sufficient to meet their allowances.

Figures in Table 3 indicate that the females of the family occupied a relatively unfavorable position as compared to the males in regard to the intake of most nutrients. As a whole, the young children (age groups under ten) had the best food records. Next came the rest of the male members of the family. The two groups which fared most poorly were the women of child-bearing age and the adolescent girls.

As in the family records, calcium was the nutrient most likely to be low. For the males, average intakes of all other nutrients approximately met the ap-

TABLE 3

*Average nutrient intake by age group and sex*

| AGE GROUP | NUMBER OF INDIVIDUALS | | NUTRIENT INTAKE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Replying | Not replying | Energy | Protein | Calcium | Iron | Vitamin A | Thiamine | Riboflavin | Niacin | Ascorbic acid |
| **Males** | | | | | | | | | | | |
| | | | *calories* | *gm.* | *mg.* | *mg.* | *I.U.* | *mg.* | *mg.* | *mg.* | *mg.* |
| 1– 3 years | 41 | 8 | 1569 | 56.0 | 1158 | 12.2 | 4,869 | 1.17 | 1.86 | 6.8 | 60 |
| 4– 6 years | 37 | 0 | 2028 | 69.0 | 1126 | 11.5 | 5,779 | 1.20 | 1.99 | 10.1 | 76 |
| 7– 9 years | 34 | 0 | 2193 | 73.7 | 1100 | 10.9 | 7,509 | 1.23 | 2.01 | 12.1 | 69 |
| 10–12 years | 29 | 1 | 2557 | 84.9 | 1318 | 13.6 | 11,072 | 1.46 | 2.47 | 14.1 | 85 |
| 13–15 years | 25 | 0 | 3654 | 106.7 | 1606 | 18.7 | 14,824 | 1.93 | 3.00 | 17.4 | 98 |
| 16–20 years | 19 | 2 | 3375 | 97.6 | 1292 | 17.3 | 11,189 | 1.81 | 2.37 | 17.7 | 98 |
| 21–29 years | 45 | 4 | 3321 | 103.5 | 1236 | 18.6 | 9,136 | 1.85 | 2.39 | 19.3 | 97 |
| 30–39 years | 76 | 1 | 2999 | 97.3 | 1049 | 17.5 | 9,291 | 1.66 | 2.31 | 19.0 | 80 |
| 40–49 years | 38 | 1 | 2821 | 94.6 | 1079 | 17.1 | 10,609 | 1.48 | 2.11 | 16.6 | 71 |
| 50–59 years | 40 | 1 | 2730 | 88.9 | 873 | 16.1 | 8,098 | 1.51 | 1.82 | 16.4 | 89 |
| 60–69 years | 30 | 1 | 2032 | 83.4 | 901 | 15.7 | 8,162 | 1.48 | 1.83 | 15.0 | 65 |
| 70 years and over | 10 | 1 | 2341 | 95.1 | 1188 | 11.7 | 12,828 | 1.30 | 2.24 | 11.5 | 55 |
| **Females** | | | | | | | | | | | |
| 1– 3 years | 27 | 8 | 1697 | 57.8 | 1082 | 8.8 | 6,564 | 0.93 | 1.81 | 7.5 | 56 |
| 4– 6 years | 34 | 0 | 1849 | 64.4 | 1120 | 9.3 | 5,071 | 1.08 | 1.97 | 9.8 | 55 |
| 7– 9 years | 23 | 0 | 2026 | 68.8 | 1177 | 10.3 | 6,832 | 1.09 | 1.95 | 9.7 | 58 |
| 10–12 years | 10 | 0 | 2275 | 70.0 | 1111 | 10.6 | 5,354 | 1.19 | 1.93 | 10.7 | 81 |
| 13–15 years | 20 | 0 | 1945 | 62.2 | 936 | 10.0 | 5,992 | 1.14 | 1.66 | 10.8 | 70 |
| 16–20 years | 24 | 0 | 1976 | 65.1 | 910 | 11.1 | 6,541 | 1.03 | 1.67 | 10.9 | 63 |
| 21–29 years | 54 | 1 | 2066 | 64.6 | 702 | 12.0 | 7,404 | 1.20 | 1.51 | 12.2 | 72 |
| 30–39 years | 80 | 0 | 2047 | 65.5 | 714 | 11.7 | 7,052 | 1.13 | 1.49 | 12.4 | 67 |
| 40–49 years | 41 | 0 | 1982 | 64.2 | 669 | 12.5 | 10,051 | 1.06 | 1.44 | 11.6 | 77 |
| 50–59 years | 34 | 0 | 1843 | 63.2 | 680 | 12.0 | 7,950 | 1.08 | 1.46 | 11.8 | 86 |
| 60–69 years | 23 | 1 | 1982 | 58.5 | 640 | 12.5 | 6,124 | 1.11 | 1.42 | 11.3 | 59 |
| 70 years and over | 11 | 2 | 1614 | 52.7 | 705 | 10.0 | 7,508 | 0.99 | 1.49 | 9.3 | 55 |

propriate allowances. For protein and calcium, average intakes were a little low for the sixteen-to-twenty-year-old males. Average intakes of calories, calcium, and ascorbic acid were slightly low in the later years. The intake averages for females were, in general, not quite as good as the males in relation to allowances. For calories it is interesting to note that through adolescence, the girls averaged intakes of 400 to 700 calories below the allowances and that most adult women were at or slightly below the needs given for sedentary women. In the case of protein, the adolescent girls averaged 10 to 18 gm. below the allowances. The adult women just met the protein allowance until the years beyond fifty, where average intake drops slightly. The women of child-bearing years showed the poorest calcium intake in relation to needs, with the adolescent girls running a close second. The latter group also fared somewhat poorly in relation to its iron needs.

*Nutrient Intakes of Individuals in Terms of Allowances*

When one looks at the distribution of nutrient intakes in terms of the Recommended Dietary Allowances according to age groups and sex, even more information is gained. Individual weaknesses are lost in averages. The distribution figures accentuate the relatively unfavorable position of the adolescent girl and the women of child-bearing age in respect to nutrient intake. The unfavorable position is disturbing, especially when it is known that the allowances used for comparative purposes for all women twenty-one years and over were those for the female at reproductive rest. Actually there was a scattering of pregnant and lactating women in the sample, but for simplicity in handling they were thrown in the larger group.

Table 4 reflects the sex differences. In general, a lower percentage of males had intakes of less than 50 per cent of the allowances and a higher percentage met or considerably exceeded the allowances, than in the case of the females.

The table does not show the age differences within the sex. In the case of calories, when girls under ten were excluded, two-thirds of the women had intakes less than 90 per cent of the allowance. This was true for an even larger portion of the adolescent girls. The relatively poor position of the adolescent girl showed up in every nutrient. Over half of the ado-

lescent girls had less than 90 per cent of the allowances for every nutrient studied. For iron, over four-fifths failed to reach 90 per cent of the allowance.

Women of child-bearing years did not fare much better; however, their point of greatest weakness was calcium, with four-fifths having less than 90 per cent of their allowance, and one-half of these with intakes less than 50 per cent. The intakes of older people tended to be somewhat lower in relation to needs for calories, protein, calcium, and ascorbic acid than those of younger people.

### COMPARISON OF FAMILY AND INDIVIDUAL DATA

Perhaps it is unjustifiable to compare the results of the family records with the family composite based on the single-day records of individual family members. However, we were interested in knowing whether the single-day records, when calculated over to a per nutrition unit basis, gave an overall picture similar to the family food records. In Table 5 is presented a comparison of the average nutrient intake per nutrition unit per family by residence, based on the family food records and on the single-day food records of individual family members.

In general, the picture given is the same. The farm families showed by far the highest averages by either method. On the basis of the individual records there was less difference between village and rural non-farm families, and in all cases the caloric intakes fell slightly below the prescribed 3000.

All in all, the agreement between the two evaluations was surprisingly good. Individual records represented actual intake with cooking losses and, in all probability, on the best day of the week, while the family records were merely the food available to the family with no accounting made for waste or cooking losses. The better correspondence between the two methods for village families leads one to speculate whether when the surplus of food is less great there might be less waste.

TABLE 4

*Percentage of individuals with nutrient intakes at various levels of Recommended Dietary Allowances*

| NUTRIENT | INDIVIDUALS | | | | | |
|---|---|---|---|---|---|---|
| | Intake less than 50% of Allowances | | Intake 90% or more of Allowances | | Intake 50% or more in excess of Allowances | |
| | Male | Female | Male | Female | Male | Female |
| | % | % | % | % | % | % |
| Calories | 5 | 5 | 55 | 42 | 6 | 6 |
| Protein | 1 | 4 | 81 | 65 | 25 | 14 |
| Calcium | 11 | 28 | 56 | 37 | 18 | 6 |
| Iron | 1 | 6 | 78 | 53 | 29 | 8 |
| Vitamin A | 5 | 15 | 73 | 60 | 46 | 38 |
| Thiamine | 2 | 6 | 66 | 52 | 20 | 13 |
| Riboflavin | 3 | 9 | 73 | 59 | 33 | 18 |
| Niacin | 2 | 7 | 66 | 56 | 16 | 10 |
| Ascorbic acid | 14 | 20 | 61 | 51 | 26 | 20 |

### SUMMARY

Food usage in terms of nutrients available are reported for 221 farm, rural non-farm, and village families, and for 805 individuals in the fall season of the year. Similar information is presented for 175 families in the spring.

On the basis of the family food records, making no allowance for waste or cooking losses, the average picture was one of adequacy in relation to the Recommended Dietary Allowances for every nutrient except calcium. The village families had the least favorable intakes, followed by the rural non-farm group, with the farm families having the most abundant supply of nutrients available. Individual families were markedly below the allowances for several nutrients.

There were no essential differences in average nutrients available per nutrition unit in the fall and in the spring, except in the case of vitamin A. For

TABLE 5

*Comparison of family and individual data on per nutrition unit basis*

| TYPE OF RECORD AND RESIDENCE | NUMBER OF FAMILIES | ENERGY | PROTEIN | CALCIUM | IRON | VITAMIN A | THIAMINE | RIBOFLAVIN | NIACIN | ASCORBIC ACID |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *calories* | *gm.* | *mg.* | *mg.* | *I.U.* | *mg.* | *mg.* | *mg.* | *mg.* |
| Farm | | | | | | | | | | |
| Family | 46 | 3518 | 109.0 | 1274 | 18.8 | 12,941 | 2.38 | 3.03 | 23.5 | 145 |
| Individual | 46 | 2918 | 94.9 | 1051 | 15.9 | 10,536 | 1.80 | 2.46 | 17.7 | 78 |
| Rural, non-farm | | | | | | | | | | |
| Family | 73 | 3544 | 95.8 | 1005 | 17.3 | 9,864 | 2.13 | 2.42 | 21.8 | 133 |
| Individual | 72 | 2722 | 78.0 | 870 | 13.9 | 8,332 | 1.53 | 2.04 | 15.1 | 79 |
| Village | | | | | | | | | | |
| Family | 102 | 3011 | 85.8 | 916 | 14.7 | 9,734 | 1.89 | 2.18 | 18.9 | 124 |
| Individual | 102 | 2664 | 79.3 | 904 | 13.4 | 7,948 | 1.52 | 2.10 | 15.7 | 84 |
| Total study | | | | | | | | | | |
| Family | 221 | 3292 | 94.0 | 1020 | 16.4 | 10,445 | 2.07 | 2.44 | 20.8 | 131 |
| Individual | 220 | 2736 | 82.1 | 923 | 14.1 | 8,615 | 1.58 | 2.16 | 15.9 | 81 |

every residential group the vitamin A available in the spring was substantially under that available in the fall, but still exceeded the allowance.

Single-day records for individual family members showed the female members of the family to occupy a relatively less favorable position as compared to the male members in regard to the intake of most nutrients. It would appear that the young children had the best food records; next came the rest of the male members of the family. The two groups which fared most poorly were the women of child-bearing age and the adolescent girls. Adequate family averages covered up less adequate intakes of individual family members. A sizable percentage of individuals failed to meet the allowances with a smaller percentage who had rather marked deficiencies in intake.

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### *Army Needs Seventy Dietitians*

As a result of the expansion of the Armed Forces, the Army Medical Service's requirements have increased proportionately, and seventy additional dietitians for the Women's Medical Specialist Corps are urgently needed. In Army hospitals, dietitians have been given even greater responsibilities in the organization and management of their departments, and with this increased responsibility have come greater opportunities for advancement in administrative and therapeutic fields.

The Surgeon General of the Army has forwarded the following information to the American Dietetic Association office, and the JOURNAL is happy to publicize it so that the entire profession may know about the requirements of the Army in this national emergency:

(a) Dietitians who hold a reserve commission through the rank of captain in the Women's Medical Specialist Corps may request extended active duty for twenty-one months or longer in their present grade.

(b) Applicants who do not hold reserve commissions, to be eligible for appointment in the Women's Medical Specialist Corps, must have a bachelor's degree from an approved college with either a major in foods and nutrition or in institutional management. In addition, they must have completed an approved dietetic internship. Initial appointments will be made in the grades of second lieutenant, first lieutenant, and captain depending upon qualifications of the applicant. The salary in the grade of second lieutenant is $2565 annually plus quarters and $42 subsistence allowance monthly. A uniform allowance of $250 is provided for newly commissioned officers at the time they report to Brooke Army Medical Center for basic military training.

All dietitians who have not had prior military service receive a short period of basic military training at the Medical Field Service School, Fort Sam Houston, Texas. The purpose of this course is to bridge what might otherwise be an abrupt transfer from civilian life to a military career. It is an orientation to military life to acquaint new officers with Army regulations and procedures.

Additional information, together with application forms, will be forwarded upon receipt of a request addressed to the Surgeon General, Department of the Army, Attention: Chief, Women's Medical Specialist Corps, Washington, 25, D. C.

# Significance of Vitamin $B_{12}$ and Related Factors[1]

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DURING the past three years rapid advances have been made in determining the biochemical and nutritional significance of a new member of the vitamin B complex, which has been termed "vitamin $B_{12}$." In addition to studies on the effect of a deficiency of this factor on a wide variety of animals and microorganisms, chemical studies have permitted purification and isolation of the vitamin from liver and fermentation products in crystalline form. Perhaps the greatest impetus to these studies was the observation that this vitamin was effective in treating pernicious anemia in man.

For many years pernicious anemia and allied macrocytic anemias have been successfully treated with crude and refined liver extracts. Attempts to isolate and identify the active factor or factors in liver were greatly handicapped by the necessity of assaying the potency of the liver preparations with pernicious anemia patients. Obviously, this was a tedious and insensitive technique for following the isolation of the active factor from liver.

As this work was in progress, an unknown growth factor for *Lactobacillus lactis* Dorner was also found to be present in high amounts in these anti-pernicious anemia liver extracts. The independent finding that the most active liver preparations were red, which permitted colorimetric determination of the potency, also greatly facilitated the fractionation and isolation in crystalline form of a factor from liver which was very effective in treating pernicious anemia. This factor has been termed "vitamin $B_{12}$."

Other investigations demonstrated that vitamin $B_{12}$ is required in the diet for optimum growth of the rat, mouse, chick, and pig and is also an essential growth factor for several microorganisms. Thus, it is already apparent that vitamin $B_{12}$ is of great importance for treating macrocytic anemias in man and also as an essential nutrient for animals of economic importance, such as poultry and swine.

In the present report, the activity of vitamin $B_{12}$ in replacing unknown factors essential for different animal and microbial species, the occurrence of additional unknown factors not replaceable by vitamin $B_{12}$, methods for the determination of vitamin $B_{12}$, and the distribution of vitamin $B_{12}$ in foods will be discussed. In addition, information of the mechanism of action of vitamin $B_{12}$ in metabolism will be presented.

The anti-pernicious anemia factor was first isolated from liver by Rickes and associates (1) and Smith (2). This compound was called vitamin $B_{12}$ by Rickes *et al.* and was found to contain about 4 per cent cobalt and to have a molecular weight of approximately 1500. Subsequent reports (3–8) have shown that it contains nitrogen and phosphorus, and the partial structure includes benzimidazole and ribose units. A partially hydrogenated derivative, called "vitamin $B_{12a}$" and a derivative obtained from liver extracts and certain fermentation products which has a different absorption spectrum from vitamin $B_{12}$ have been reported (9, 10). The latter compound has been designated "vitamin $B_{12b}$." In the present report, vitamin $B_{12}$ will be used to include all biologically active vitamin $B_{12}$ derivatives unless specifically stated otherwise.

## VITAMIN $B_{12}$ AS GROWTH FACTOR

By the use of several experimental techniques, the requirement of an unknown factor present in liver and liver concentrates, fish by-products, and milk was shown for chicks, rats, pigs, turkeys, the mouse, cotton rat, and rabbit and for certain bacterial strains and an alga, *Englena gracilis*. It is of interest that when the purified diets containing purified casein as purchased from commerical sources were used, only slight improvements in the growth of chicks or rats were noted when liver concentrates were added (11–13). However, when the casein was further extracted with alcohol (14), when plant products, such as soybean oil meal and corn, were used (15), or when a thyroid stimulating substance, such as desiccated thyroid or iodinated casein, was fed (16, 17), a marked growth stimulation was obtained when crude or refined liver extracts were added to the diets.

[1] Presented in part before the Illinois Dietetic Association on May 4, 1950 in Chicago.

TABLE 1

*Factors replaceable by vitamin $B_{12}$*

| FACTOR | SOURCE |
|---|---|
| Anti-pernicious anemia | Crude and refined liver extracts |
| Rat growth, reproduction and lactation (nutrient X, Zoopherin) | Crude casein, liver and liver extracts, and fish products |
| Chick growth and hatchability (animal protein factor) | Fish products, liver extracts, and cow manure |
| Pig growth (animal protein factor) | Liver extracts and animal and fish by-products |
| *Lactobacillus lactis* Dorner | Liver extracts |
| *Lactobacillus leichmannii* | Liver extracts |

TABLE 2

*Response of two patients with pernicious anemia to vitamin $B_{12}$ therapy**

| PATIENT | RED BLOOD CORPUSCLES | | HEMOGLOBIN | | RETICULOCYTES AT PEAK |
|---|---|---|---|---|---|
| | Initial | Final | Initial | Final | |
| | *million* | *million* | % | % | % |
| 4 | 2.37 | 3.24 | 9.5 | 11.8 | 12.8 |
| 5 | 2.50 | 3.10 | 9.5 | 11.2 | 14.6 |

* 6 and 15 mcg. injected intramuscularly.

This effect of the addition of liver preparations was even more marked when the breeding stock was fed all plant rations deficient in this factor (18–20). It was soon apparent from these studies that the active growth factor was present in certain animal products in high amounts, but was essentially absent from plant products, such as grains, soybean, and peanut meal, yeast, and alfalfa. As a consequence, this factor or factors required for the chick and pig in the liver preparations was termed the animal protein factor. The existence of these and related factors for several animal species has been summarized previously (21).

Since vitamin $B_{12}$ has been available in a pure form, the ability of this vitamin to replace the liver concentrates has been studied. Those factors considered to be replaceable by vitamin $B_{12}$ are summarized in Table 1. It will be noted that the occurrence of these factors suggests that the active substance may be the same for all of the organisms in that liver, fish, and milk products were found to be excellent sources. That intestinal microorganisms synthesize considerable amounts of vitamin $B_{12}$ is suggested by the finding that cow manure was a good source of a chick growth factor (22). It should not be inferred that additional unknown factors which are required by the chick, rat, or pig are not present in these products, but that vitamin $B_{12}$ accounts to a large extent for the growth improvements observed with the experimental conditions used. Representative data illustrating the activity of vitamin $B_{12}$ in treating pernicious anemia in man (23), for growth of rats (14, 24), and chicks (15, 25) are presented in Tables 2, 3, and 4, respectively. Vitamin $B_{12}$ has been found to improve the reproduction and lactation performance of the rat (26). The effectiveness of vitamin $B_{12}$ in replacing the active factors in liver for pigs (27, 28) and the mouse (29) has also been demonstrated.

TABLE 3

*Effect of liver extracts and vitamin $B_{12}$ on growth of rats*

| RATION | SUPPLEMENT | AVERAGE GAIN |
|---|---|---|
| Liver Extract* | | |
| | *U.S.P./day* | *gm./wk.* |
| Basal | none | 29 |
| Basal | 0.5 | 40 |
| Basal plus iodinated casein | — | 21 |
| Basal plus iodinated casein | 0.5 | 41 |
| Basal plus iodinated casein | 0.05 | 32 |
| Vitamin $B_{12}$ | | |
| | *mcg./day* | *gm./wk.* |
| Basal plus iodinated casein | none | 18 |
| Basal plus iodinated casein | 0.05 | 28 |
| Basal plus iodinated casein | 0.10 | 37 |
| Basal plus iodinated casein | 0.20 | 45 |

* Injected intraperitoneally.

TABLE 4

*Growth of chicks fed anti-pernicious anemia preparations and other supplements*

| SUPPLEMENT | EXPERIMENT I—weight in 4 weeks | EXPERIMENT II—gain in 2 weeks |
|---|---|---|
| | *gm.* | *gm.* |
| None | 218 | |
| .05 APA preparation (injected) | 301 | |
| 3% fish solubles | 298 | |
| Iodinated casein | | 105 |
| Iodinated casein plus 3% fish solubles | | 190 |
| Iodinated casein plus 1.5 mcg. vitamin $B_{12}$ | | 193 |
| Iodinated casein plus .025 cc. APA preparation | | 191 |

## FACTORS NOT REPLACEABLE BY VITAMIN $B_{12}$

It has already become evident that certain of the unknown factors required by animals and microorganisms (21) are not replaceable by vitamin $B_{12}$ (Table 5). Fox and mink require more than one additional factor (30), and factors in whole liver are also required for maximum growth of the hyperthyroid rat (31, 32). That the factor present in distiller's solubles or rice polishings, termed vitamin $B_{13}$ (33) is not vitamin $B_{12}$ is deduced from the observations that the amounts of vitamin $B_{12}$ in these

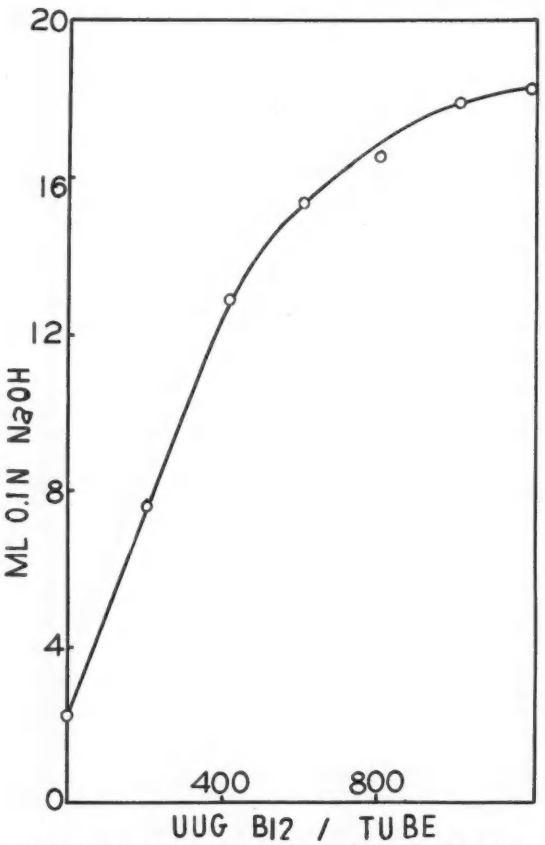


FIG. 1. *Standard curve for vitamin $B_{12}$ obtained by adding graded levels of vitamin $B_{12}$ (expressed as micromicrograms per tube) and determining the acid production by* Lactobacillus leichmannii *327.*

products are extremely low. Final proof for this conclusion awaits information on the effect of vitamin $B_{12}$ when fed with these experimental conditions. An active factor for chicks which is present in fresh grass has been reported, and vitamin $B_{12}$ is inactive in replacing this factor. It also appears unlikely that the major growth factor for *Lactobacillus bulgaricus* or *Tetrehymena geleii* is vitamin $B_{12}$. The active factor in liver extracts for *Leuconostoc citrovorum* is not vitamin $B_{12}$, but is apparently a folic acid derivative, and the complex has been called folinic acid (34–36). Thus, although several of the proposed factors are replaceable at least in part by vitamin $B_{12}$, additional and as yet unknown vitamins are required for several animals and microorganisms.

The ability of vitamin $B_{12}$ to replace other unknown factors, such as an anti-anemia factor for dogs and a factor for growth of the cotton rat and rabbit has not as yet been reported. Since these factors were found to be present in liver and liver extracts, it seems likely that at least part of the activity of these concentrates may be attributable to vitamin $B_{12}$.

TABLE 5

*Factors not replaceable by vitamin $B_{12}$*

| FACTOR | SOURCE |
|---|---|
| Growth and anti-anemia factors for fox and mink | Fresh liver and spleen, milk, and intestinal mucosa |
| Rat and chick growth (vitamin $B_{13}$) | Distiller's solubles, rice polishings, yeast, and grass |
| Anti-anemia factor for monkeys | Fresh liver |
| *Leuconostoc citrovorum* (folinic acid) | Liver extracts |
| *Lactobacillus bulgaricus* | Yeast |
| *Tetrahymena geleii* II-A | Liver, grass |

## DETERMINATION OF VITAMIN $B_{12}$

It will be recalled that *Lactobacillus lactis* Dorner and *Lactobacillus leichmannii* were shown to require vitamin $B_{12}$. Several microbiologic methods, primarily with *L. leichmannii*, have already been proposed for the determination of vitamin $B_{12}$ in natural materials (37–41). Considerable variation in the response of these organisms to vitamin $B_{12}$ has been observed, however. These variations are minimized by the addition of reducing agents such as cysteine or thioglycollic acid and by aseptic additions of the vitamin $B_{12}$ standard and the samples (38, 41, 42).

With these conditions standarized, standard curves with *L. leichmannii* are quite satisfactory (Figure 1). It will be noted that very small quantities of vitamin $B_{12}$ are required for maximum acid production by the test organism (approximately 2 mmcg. —0.002 mcg. per 10 cc. medium). The response with *L. leichmannii* 313 is similar to that obtained with *L. leichmannii* 327 (38, 42).

Further complications to the routine use of these methods include: a different stability to heat of vitamin $B_{12}$ as compared to vitamin $B_{12b}$; that the different, naturally occurring derivatives of vitamin $B_{12}$ may not have the same potency for the different test organisms; and that the microorganisms may not reflect the same potency as observed for animals. Available evidence indicates that vitamin $B_{12}$ and vitamin $B_{12b}$ are essentially equal in potency for pernicious anemia patients, the chick, rat, and *L. leichmannii* (43, 44). Although desoxyribosides are active in replacing vitamin $B_{12}$ for the test organisms (44), these compounds do not appear to be present in most products in sufficient quantities to interfere to any great extent with the vitamin $B_{12}$ assay (38). The activity of the desoxyribosides can be differentiated from that of vitamin $B_{12}$, since the vitamin $B_{12}$ activity can be destroyed by alkali treatment.

Studies conducted with liver and muscle tissue indicate that part of the vitamin $B_{12}$ occurs in these tissues in a bound form, that is, the vitamin $B_{12}$ is

unavailable to the test organisms unless the samples are incubated in the presence of enzymes such as pancreatin or trypsin prior to microbiologic assays. Extensive experimentation will be needed to establish techniques for maximum liberation of vitamin $B_{12}$ from natural materials.

Preliminary studies indicate that the vitamin $B_{12}$ potency of natural products measured microbiologically agrees quite well with the potency determined by the rat assay method. With the use of the rat assay and microbiologic assay, the vitamin $B_{12}$ potency of a number of products has been determined (17, 38, 41, 42, 46–48). The comparative distribution of vitamin $B_{12}$ in some of these foods is shown in Table 6. As more refinements are made in the microbiologic methods and further comparisons are made with animal assay methods, the accuracy of the available methods can be more effectively evaluated. These studies will then permit investigations on the stability of vitamin $B_{12}$ during cooking and processing of foods. The use of paper chromatography to separate the vitamin $B_{12}$ active fractions prior to microbiologic analyses has been very useful in determining the specificity in the response of the test organisms to vitamin $B_{12}$ (46).

TABLE 6

*Distribution of vitamin $B_{12}$ in foods*

| FOOD | VITAMIN $B_{12}$ CONTENT |
|---|---|
| Liver and kidney | High |
| Milk, Muscle meats, Fish | Medium |
| Corn, Wheat, Soybeans, Yeast | Low |

### VITAMIN $B_{12}$ IN METABOLISM

Other studies have provided clues as to the mechanism of action of vitamin $B_{12}$ in metabolism. Studies with microorganisms have indicated that desoxyribosides can replace the requirement for vitamin $B_{12}$. Thymidine (thymine desoxyriboside) has been tested most extensively (45). These findings suggest that vitamin $B_{12}$ may function as part of a coenzyme in systems which synthesize these essential units of nucleic acids. Thus, when the desoxyribosides are added, at least one of the functions of vitamin $B_{12}$ for these organisms is circumvented, if the desoxyriboside is a product of an enzyme system in which vitamin $B_{12}$ functions. Further studies will be needed to clarify this apparent function for vitamin $B_{12}$ and to ascertain the specific steps in the desoxyriboside synthesis involved.

Vitamin $B_{12}$ appears to have another function, which is apparently unrelated to the above mechanism. Vitamin $B_{12}$ markedly reduces the amount of choline or methionine as a methyl donor required in the diet of the rat or chick. Conversely, dietary choline has a sparing action on the vitamin $B_{12}$ requirement (44, 49, 50). It has been postulated, therefore, that vitamin $B_{12}$ may function in enzyme systems that synthesize labile methyl groups or that vitamin $B_{12}$ is in some way required for the effective utilization of methyl groups supplied by other mechanisms.

These studies on various phases of research on vitamin $B_{12}$ in nutrition and metabolism clearly indicate the fruitfulness of various experimental approaches in yielding information on the significance of this vitamin. The need for evaluating the effect of a deficiency of this vitamin for various animals and microorganisms including man, for reliable methods for determining the distribution of this vitamin in foods, for evaluating the effect of cooking or other processing methods on the stability, and for understanding the mechanism of action of vitamin $B_{12}$ in metabolism is readily apparent. The interrelationships in the determination of dietary requirements are evident. Thus, the amount of vitamin $B_{12}$ in the diet will affect the dietary requirement for choline or of methionine and presumably vice versa. Some evidence is available to indicate that the vitamin $B_{12}$ requirement is increased when the protein level in the diet is increased (14) and that high-fat diets spare the requirement for vitamin $B_{12}$ (29, 51).

Folic acid and vitamin $B_{12}$ are apparently closely interrelated which is evidenced not only by their effectiveness in treating the anemia of pernicious anemia and allied diseases, but also by effects observed in the nutrition of rats and chicks (52). It is also apparent that the role of intestinal microorganisms in synthesizing vitamin $B_{12}$ is important.

With further information on these problems, the role of vitamin $B_{12}$ in nutrition and metabolism in relation to other dietary factors will be more clearly defined.

### SUMMARY

The significance of vitamin $B_{12}$ in replacing the active factors in liver preparations for the treatment of pernicious anemia in man, and for promoting growth of swine, rats, chicks, and mice is discussed. Evidence is presented to show that factors in addition to vitamin $B_{12}$ are required for several animal and microbial species.

Other studies have been carried out to devise assay methods for determining vitamin $B_{12}$, particularly with the use of the rat and *Lactobacillus leichmannii*. These investigations have shown that muscle and organ meats, milk, and fish products are good sources of vitamin $B_{12}$ while plant products are poor sources of the vitamin. The need for further improvements in the assay methods is emphasized before adequate evaluation of the actual amount and stability of vitamin $B_{12}$ can be made.

The metabolic processes in which vitamin $B_{12}$ may function is also considered.

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## Ion-Exchange Resins May Reduce Need for Low-Sodium Diets

The use of resins to relieve heart conditions, high blood pressure, and gastric ulcers was discussed in a paper given at the American Chemical Society meeting in Chicago in September by Evan W. McChesney, Frederick C. Machod, and Maurice L. Tainter, of Sterling-Winthrop Research Institute, Rensselaer, New York.

The paper explained that patients with hypertension and other related ailments tend to develop dropsy or edema, due to their inability to eliminate enough sodium. Hence, low-sodium diets, which tend to be unpalatable, are ordered, as well as the intake of large amounts of water for the purpose of washing the sodium salts out of the body.

Some time ago, Dock of Long Island University suggested that compounds called ion exchange resins might provide relief for the dropsy victim by removing sodium from his food and substituting the ions of other metals for it. Thus the consumption of a fairly normal diet would be allowed, while reducing the danger of edema.

Drs. McChesney, Machod, and Tainter have made further studies of this theory, both with laboratory animals and human patients and report "very encouraging results." They said: "When the animals consume their normal diet mixed with resin, as much as three-quarters of the sodium they eat is never absorbed. The same is true of human subjects. The latter have no great difficulty in taking, over long periods of time, the amounts of resin they need to keep them free from edema. This does, however, cause other complications such as acidosis and potassium deficiency, so that the rather constant supervision of a physician is necessary." The report emphasized that resins do not provide a cure, but that they do offer promise of definite improvement in the lot of these sufferers.

The use of ion exchange resins is also suggested as part of the treatment of patients with gastric ulcer. Since these resins are insoluble materials that have the property of exchanging one ion for another, there is a possibility of using a resin to substitute for harmful or objectionable ions in certain diseases or conditions. The paper pointed out that "ulcer patients experience distress as a result of excessive acid secretion by the stomach and the action of this acid on an ulcerated or eroded area. Relief is afforded by neutralizing the stomach acid, or at least by decreasing the amount present. For this purpose, a variety of agents has been used, some common examples being baking soda, alumina gel, milk of magnesia, and magnesium trisilicate. Some, particularly baking soda, provide only transient relief.

"The study of patients suffering from gastric ulcer shows that they can easily take amounts of resin necessary to neutralize the gastric acidity and give relief. Small doses are taken several times a day, perhaps as often as four to eight times. It has been found that this treatment will usually render them pain-free in about a week, and that they will remain so on prescribed diets with frequent doses of resin." However, although the ion exchange resins have relief-giving properties, they have no special advantage over other forms of treatment now employed, so it remains to be seen how widespread their use will become.

# Nutritional Status of Children

## XII. Evaluation by Computing the Food Intake of a Group and by Weighing and Analyzing Foods Eaten by Representative Subjects[1]

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FOR this paper, in addition to records of the per capita food consumption of another group of children, data were available showing the differences in the food intakes of representative children in the fall and in the spring. The deviation of values determined with standard tables of food composition and the weights of foods eaten, from results of analyses of samples representing accurately the food ingested will be discussed in detail in the following paper (1). Using the values obtained by the widely used procedures of evaluating diets in relation to published records of food composition and recommended intakes and, as well, the data determined by analyses of food eaten, it has been possible to evaluate intakes of nutrients in relation to: (a) the Family Food Plans for Good Nutrition (2) of the United States Department of Agriculture; (b) the recommendations of the Food and Nutrition Board (3) of the National Research Council; and (c) evidence of nutritional status procured by determining constituents of the blood of the children.

### PROCEDURE

The Holy Family Orphans' Home at Marquette, Michigan, cares for about one hundred boys and girls ranging in age from the pre-school level to about seventeen years. The staff makes a sincere effort to supply proper food for the children. The farm at the institution supplies much of the meat, eggs, dairy products, and vegetables and the cook and her assistant prepare all food in a central kitchen for the children and seventeen adults. The menus, planned for a week in advance, are kept flexible to allow substitutions. Local organizations and businesses in the community frequently contribute usable food, thereby amplifying a limited food budget.

Because a perpetual food inventory was not maintained, an "inventory" determination of food used was not practical. For a period of seven consecutive days during the fall, the quantity or volume of food prepared at each meal was measured, weighed, or estimated, and records were kept of uneaten food and waste for each meal. From this record, all the food eaten by both children and adults at the Home during the week was computed.

Blood samples were obtained by finger puncture from all children in the orphanage for microchemical determinations of hemoglobin (4), serum protein (5), serum vitamin A and carotenoids (6), serum vitamin C (7), and serum alkaline phosphatase (8). Fasting and load samples of urine were collected for thiamine and riboflavin analyses (9).

Four healthy youngsters old enough to cooperate intelligently were selected to represent the total population of the home in a more extensive study of food intakes. In the fall the subjects were two boys, eight and twelve years old, and two girls of the same ages. Three of the same subjects cooperated in the spring, but one girl (Judith), who became ill after two days, was replaced by a girl of the same age. A boy of the same age was substituted for Leroy who was not available for the later study.

During the two study periods, the youngsters pursued their customary activities of school work, assigned duties, and outdoor play times, including short hikes and other moderately energetic activities. Both in November and the following April, snow was deep on the ground, but the children were not kept indoors. For seven consecutive days in each season the four children ate in the main dining room, receiving foods identical with those served to the other children after their portions had been weighed by the Laboratory staff workers. Quantities of food were adjusted to requests of individuals. For the most part the

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children ate all food served to them, frequently requesting second and third helpings. Any food remaining after a meal was weighed and the amount subtracted from the intake.

### *Calculation of Nutrients in Food*

Standard tables of food values (10–22) were used to calculate intakes of nutrients from the amounts of each food ingested. Values for cooked foods were used when available; in other instances allowances were made for losses in cooking. Recipes for all mixed dishes were used to calculate the percentage composition in terms of the various components.

### *Food Composites for Chemical Analysis*

Daily food composites representative of the weighed diets were collected for chemical analysis as described in an earlier paper (23). For one child, duplicate samples were collected on seven successive days to determine variations in sampling. Portions of all foods except butter, identical in size with those eaten, were included in the daily composites for each child. Vitamin A and carotenoids were determined separately in a sample of butter from each churning during the week. Additional samples of tap water and milk also were analyzed separately. At both seasons separate collections were made of foods known to contain vitamin C, to which 6 per cent metaphosphoric acid solution was added before storage in the freezer.

### *Analytical Methods*

Food energy, nitrogen, fat, calcium, phosphorus, vitamin A, carotenoids, thiamine, riboflavin, niacin, and vitamin C were determined. Energy was determined by the oxygen bomb calorimeter (24); nitrogen by the macro-Kjeldahl procedure of Scales and Harrison, using the protein conversion factor of 6.25 (24); and fat by a method based upon a procedure of Tidwell and Holt (24). Calcium determination was based upon a procedure by Scott (24), and the method for phosphorus was that of Dickman and Bray (25). Vitamin A was determined by the antimony trichloride method and total carotenoids separated by a chromatographic procedure (26). Thiamine was determined by the thiochrome method with slight modifications (27), riboflavin by a modified Conner and Straub procedure (28), and niacin by the assay procedure of Snell and Wright with modifications introduced by Krehl, Strong, and Elvehjem and by this Laboratory (29). For vitamin C, a slight modification of the titration procedure described by Bessey and King (30) was used.

## RESULTS AND DISCUSSION

### *Evaluation of Institutional Food Consumption*

Dietary evaluation with a record of food consumption is especially applicable in institutions where time, money, and personnel resources do not permit a more intensive investigation. In Table 1 are shown the quantities of foods in the various groups used in one week at Holy Family Orphans' Home in relation to the quantities recommended in the low-cost menu suggested by the United States Department of Agriculture (2), weighted according to the number of individuals in each age group. The percentages of recommended amounts consumed by the children and adults show that the diet provided extremely liberal amounts of milk, legumes, green and yellow vegetables, and sugar, but less than the recommended amounts of other vegetables and fruit, meat, eggs, citrus fruit, flour and cereals, and fats and oils.

TABLE 1

*Consumption of food in one week by 102 children and 17 adults*

| FOOD GROUP | CONSUMPTION | RECOMMENDATION FOR LOW-COST MENU (2)* | PER CENT OF RECOMMENDATION |
|---|---|---|---|
| | *lb.* | *lb.* | |
| Milk and cheese | 2341 | 1327 | 176 |
| Dried beans and peas and nuts | 49 | 21 | 233 |
| Eggs | 20† | 48½† | 42 |
| Meat, poultry, and fish | 133 | 185 | 72 |
| Citrus fruit and tomatoes | 124 | 184 | 67 |
| Green and yellow vegetables | 226 | 184 | 123 |
| Potatoes and sweet potatoes | 287 | 288 | 100 |
| Other vegetables and fruit | 214 | 265 | 81 |
| Flour and cereals | 252 | 330 | 76 |
| Fats and oils | 50 | 76 | 66 |
| Sugars, sirups, and preserves | 221 | 67 | 330 |

* Calculated from Family Food Plans for Good Nutrition (2) and weighted by the number of individuals in each age group.

† Number of dozens.

Recommended food intakes such as the Family Food Plans encompass a distribution which will provide ample amounts of all essential nutrients and in many respects deviations in one food group may be offset by variation in the opposite direction in another food group. Inspection of Table 1 indicates that the low intake of "other vegetables and fruit" was offset by high intakes of green and yellow vegetables and of milk. The high intake of sugars more than compensated for the low consumption of fats and oils, insofar as energy was concerned, but could not have provided any substitute for preformed vitamin A. Although the low consumption of eggs and meat might indicate a shortage of iron and protein, the liberal intakes of legumes and milk would partially compensate for the deficits. The amounts of citrus fruit and tomatoes eaten were only two-thirds of the quantities recommended.

In the evaluation of records of total food consumption, which indicate adequacy of food available for a group but give no information concerning the nutritional state of any individual, some factors must

TABLE 2

*Average percentages of food groups recommended in Family Food Plans (2) as determined by weighed daily food intakes of four children during seven consecutive days*

| SUBJECTS | AGE | PERCENTAGE OF RECOMMENDATION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Milk and cheese | Dried beans and peas, nuts, eggs, meat, poultry, and fish | Citrus fruit and tomatoes* | Green and yellow vegetables† | Potatoes, sweet potatoes, other vegetables and fruit‡ | Flour and cereals | Fats and oils, sugar, sirups, and preserves |
| *Fall* | | | | | | | | |
| | *mos.* | | | | | | | |
| Robert | 146 | 97 | 75 | 100 | 121 | 145 | 145 | 125 |
| Donna | 147 | 122 | 84 | 147 | 122 | 172 | 146 | 129 |
| Leroy | 102 | 121 | 85 | 123 | 100 | 136 | 178 | 144 |
| Judith§ | 98 | 114 | 76 | 127 | 96 | 133 | 138 | 142 |
| Mean for total population at Home‖ | | 176 | 77 | 67 | 123 | 90 | 76 | 190 |
| *Spring* | | | | | | | | |
| Robert | 152 | 84 | 94 | 120 | 49 | 178 | 156 | 108 |
| Donna | 153 | 106 | 98 | 136 | 49 | 194 | 169 | 117 |
| Ronald | 103 | 115 | 83 | 121 | 39 | 136 | 163 | 120 |
| Judith§ | 103 | 134 | 85 | 88 | 40 | 160 | 130 | 79 |
| Shelby§ | 100 | 121 | 90 | 100 | 36 | 138 | 151 | 132 |

* Weighed value includes cabbage, green peppers.

† Weighed value includes peaches.

‡ Weighed value excludes peaches, cabbage, green peppers.

§ Judith's values represent first six days in fall and first two days of study period in spring. Values for last day of fall period and third day of spring period omitted because of illness. Replaced in spring study by Shelby, whose values represent the last four days of the study period.

‖ From Table 1.

be considered which cannot be converted to a quantitative basis. The milk used at the Home, except for about 10 gal. a day from a commercial source, was produced on the farm operated by the Home and was hand-skimmed before use. Eggs were used only in numbers supplied by the farm flock. The green and yellow vegetables used in abundance also were grown on the farm and probably were subject to less loss of nutrients than similar foods obtained from markets. The per capita consumption of food by the children must have been higher than the average per person for the entire population, owing to the freedom of the adults to obtain meals away from the orphanage. Considering these facts with the data, the diet would seem adequate, but not ample in some respects, in the absence of any other indications of dietary deficiency in the group.

*Weighed Intakes of Foods by Selected Individuals*

A record of food consumption provides no indication of whether the total amount of food consumed by a group is properly distributed among the individuals and consumed according to age and need. Evaluation of the adequacy of the diet at Holy Family Orphans' Home was assisted by calculation of the percentages of recommendations supplied by the weighed diets of four children during the seven consecutive days in the fall. The values in Table 2 have been consolidated into fewer groups than the distribution in Table 1, but comparable values are shown for the total population of the institution with two exceptions: (a) In the weighed intakes of the individuals, peaches were included with "green and yellow vegetables" rather than with "other vegetables and fruit"; and (b) because of their value as sources of vitamin C, cabbage and green peppers were grouped with "citrus fruit and tomatoes." On this basis, the food intakes of the four children were much closer to meeting recommendations of the Family Food Plans (2) than was the diet estimated for the group.

Milk and its products and fats and sugars were eaten by the four children in considerably smaller amounts than indicated for the total population. Their intakes of green and yellow vegetables were only slightly lower in percentages of recommendations than the diet of the entire group. For the other four food groups, the weighed intakes of the four children were higher in relation to requirements than the estimated percentage for all children and adults. On the basis of the weighed intakes and the Family Food Plans, the diets of the four children in the fall could be considered ample except for the possible shortage of protein foods indicated by in-

takes of legumes, eggs, and meat ranging from 75 to 85 per cent of recommendations.

Corresponding values for the group of five children studied in the spring for the same length of time, also are shown in Table 2. In the groups of foods, important differences of the spring dietary from that in the fall were the somewhat higher percentages of the recommended amounts of protein foods and the much lower intakes of green and yellow vegetables. Both fall and spring values demonstrate individual differences attributable to discrepancies in size, activity, eating habits, and physiologic variability. Since the study periods were only one week in length, participation in the investigation, may have influenced the eating pattern of all or some of the children. Ashworth (31) has demonstrated that children living in their own homes do not always conform to the family dietary pattern, and although the eating patterns of the children at the Home were restricted by the food available, the lack of restriction on number of servings provided some freedom in choosing food.

*Pattern of Nutrients Supplied by Food Groups*

Using the weights of the mean daily intakes of the various foods for the four children studied during the fall period, the estimated amounts of nutrients supplied were combined for food groups similar to those used in the Family Food Plans (Table 2). In Table 3 are indicated the percentages of the mean daily intakes of the nutrients derived from each of the food groups.

The importance of the high intakes of milk in compensating for relatively lower supplies of some other types of food is demonstrated by the provision of only 18 per cent of total calories from milk and cheese but 42 per cent of the protein, 22 per cent of the thiamine, 67 per cent of the riboflavin, 81 per cent of the calcium, and 54 per cent of the phosphorus intakes. Butter contributed only 2 per cent of the calories and 5 per cent of the vitamin A in the diet. In a diet minimal with respect to ascorbic acid, the contribution of 12 per cent of the total intake by milk would be extremely significant. Roberts, Blair, and Greider (32), in reporting the percentage contributions of dairy products (including butter) to their "generously adequate diet" for institutionalized children, list 39 per cent of calories, 45 per cent of protein, 43 per cent of vitamin A, 70 per cent of riboflavin, 22 per cent of thiamine, 7 per cent of vitamin C, and 79 per cent of the calcium.

Only 3 per cent of the protein intake was contributed by eggs. Milk provided 42 per cent of the protein intake, cereals 23 per cent, legumes 10 per cent. Only 14 per cent was derived from meat. The legumes alone contributed twice the calories and more phosphorus and niacin than did meat, poultry, and fish. Roberts, Blair, and Greider (32) found eggs and meat contributed proportionately more nutrients to their diet than did legumes. Mack, Shevock, and Tomassetti (33, 34) from studies of the relative merits of meat and legumes in good diets fed to growing children reported that children consuming a high-meat diet (34) surpassed those on the low-meat diet in many tests, including weight status for

TABLE 3

*Percentage contribution of food groups to total daily intakes of nutrients in the fall by four children*

| FOOD GROUP | PERCENTAGE OF DAILY INTAKE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Energy | Protein | Calcium | Phosphorus | Vitamin A | Thiamine | Riboflavin | Niacin | Ascorbic acid |
| Milk and cheese | 18 | 42 | 81 | 54 | 4 | 22 | 67 | 7 | 12 |
| Dry beans and peas and nuts | 8 | 10 | 3 | 10 | 0 | 10 | 4 | 18 | 0 |
| Eggs | 1 | 3 | 1 | 2 | 6 | 1 | 3 | 0 | 0 |
| Meat, poultry, and fish | 4 | 14 | 1 | 8 | 8 | 15 | 7 | 17 | 0 |
| Citrus fruit and tomatoes* | 2 | 2 | 2 | 2 | 12 | 4 | 1 | 4 | 44 |
| Green and yellow vegetables† | 3 | 2 | 3 | 3 | 59 | 4 | 3 | 4 | 17 |
| Potatoes, sweet potatoes, other vegetables and fruit‡ | 9 | 3 | 1 | 4 | 4 | 7 | 1 | 1 | 25 |
| Flour and cereals | 34 | 23 | 6 | 16 | 2 | 36 | 13 | 43 | 0 |
| Butter | 2 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 0 |
| Fats and oils, sugar, sirups, and preserves | 19 | 1 | 2 | 1 | 0 | 1 | 1 | 5 | 2 |

* Weighed value includes cabbage and green peppers.

† Weighed value includes peaches.

‡ Weighed value excludes peaches, cabbage, and green peppers.

TABLE 4

*Average daily intakes of nutrients determined by analyses of food eaten by four children during seven consecutive days in fall and in spring*

| SUBJECT | ENERGY | | PROTEIN† | FAT | CALCIUM | PHOSPHORUS | VITAMIN A | CAROTENE | VITAMIN A‡ | THIAMINE | RIBOFLAVIN | | NIACIN | VITAMIN C | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Heat of combustion | Physiologic fuel value* | | | | | | | | | Chemical determination | Microbiologic determination | | Reduced | Total |
| | *calories* | *calories* | *gm.* | *gm.* | *mg.* | *mg.* | *mcg.* | *mcg.* | *I.U.* | *mg.* | *mg.* | *mg.* | *mg.* | *mg.* | *mg.* |
| *Fall* | | | | | | | | | | | | | | | |
| Robert | 2189 | 1918 | 80.7 | 57.4 | 1293 | 1572 | 378 | 2756 | 6219 | 1.18 | 2.75 | 3.18 | 13.98 | 36 | 56 |
| Donna | 2432 | 2115 | 91.6 | 63.7 | 1394 | 1831 | 655 | 2643 | 7222 | 1.35 | 3.41 | 4.26 | 16.87 | 48 | 74 |
| Leroy | 2131 | 1854 | 80.4 | 58.0 | 1232 | 1650 | 513 | 2273 | 5994 | 1.13 | 2.67 | 3.32 | 14.60 | 37 | 56 |
| Judith§ | 1962 | 1727 | 72.9 | 51.8 | 1227 | 1599 | 456‖ | 1616‖ | 4654‖ | 1.08 | 2.72 | 2.88 | 12.83 | 39 | 57 |
| Average ⁂ | | | | | | | | | | | | | | | |
| Analyzed | 2178 | | 81.4 | 57.7 | 1286 | 1663 | 500 | 2322 | 6022 | 1.18 | 2.89 | 3.41 | 14.57 | 40 | 61 |
| Calculated | 2093** | 1904 | 79.3 | 47.0 | 1283 | 1572 | | | 3704 | 1.58 | 2.34 | 2.34 | 11.58 | | 67 |
| *Spring* | | | | | | | | | | | | | | | |
| Robert | 2112 | 2009 | 73.1 | 44.6 | 802 | 1462 | 227 | 714 | 2166 | 1.02 | 2.84 | 2.26 | 13.88 | 23 | 70 |
| Donna | 2301 | 2130 | 80.3 | 43.6 | 941 | 1668 | 337 | 644 | 2522 | 1.12 | 3.22 | 2.64 | 13.80 | 24 | 71 |
| Ronald | 1825 | 1708 | 63.9 | 31.6 | 848 | 1315 | 191 | 741 | 2056 | 0.88 | 2.74 | 2.26 | 10.22 | 25 | 66 |
| Judith†† | 1801 | 1569 | 73.5 | 26.2 | 1031 | 1454 | 152 | 274 | 1110 | 0.94 | 2.68 | 2.59 | 11.17 | 12 | 56 |
| Shelby‡‡ | 1948 | 1823 | 70.3 | 38.4 | 890 | 1391 | 217 | 550 | 1850 | 1.01 | 2.91 | 2.28 | 12.41 | 24 | 61 |
| Average ⁂ | | | | | | | | | | | | | | | |
| Analyzed | 1997 | | 72.2 | 36.9 | 902 | 1458 | 225 | 585 | 1941 | 1.00 | 2.88 | 2.41 | 12.30 | 22 | 65 |
| Calculated | 2043** | 1848 | 83.3 | 46.4 | 1165 | 1525 | | | 2640 | 1.21 | 2.17 | 2.17 | 12.39 | | 66 |

* From standard tables (10–22).

† Nitrogen × 6.25.

‡ Micrograms of vitamin A × 4.3 plus micrograms of carotene ÷ 0.6.

§ 6 days.

‖ 5 days.

⁂ Unweighed.

** From standard tables (10–22) by multiplying total intakes of protein, fat, and carbohydrate by factors 5.65, 9.45, 4.1, respectively.

†† 2 days.

‡‡ 4 days.

sex and age, hemoglobin, red cell count, plasma vitamin A, urinary riboflavin excretion, and skeletal mineralization.

The food groups comprising citrus fruit and tomatoes and green and yellow vegetables provided the major amounts of vitamin A (12 and 59 per cent, respectively) and of ascorbic acid (44 and 17 per cent, respectively). Twenty-five per cent of the vitamin C intake was supplied by potatoes, other vegetables and fruit.

Flour and cereals contributed the largest part of the energy (34 per cent); almost as much protein (23 per cent) as legumes, meat, and eggs (27 per cent); the largest portions of thiamine (36 per cent) and niacin (43 per cent); and significant amounts of riboflavin (13 per cent) and phosphorus (16 per cent). In studies of cereals in the average American diet (35, 36), cereal products were found to contribute 24 per cent of the thiamine, 18 per cent of the riboflavin, and 17 per cent of the niacin.

Wiehl (37), in a study of industrial diets, rated the intakes of five food groups: citrus fruits or tomatoes, green or yellow vegetables, eggs, milk, and meat. In the children's diet, large proportions of the protein, calories, thiamine, and niacin were provided by foods other than those listed by Wiehl, stressing that the role of low-potency sources of essential nutrients cannot be disregarded in dietary surveys.

### *Intake of Nutrients by Four Children in Fall and in Spring*

The mean values for the constituents of the diet at Holy Family Orphans' Home in fall and in spring (Table 4) reflect the differences between analyzed and calculated values more clearly demonstrated by the analysis of individual data (1). In

general, the majority of mean analyses of food eaten in the fall showed greater amounts of constituents than did calculation, but most of the means of analyses of food eaten in the spring were lower than the quantities estimated. Since analyses of both fall and spring samples of foods are represented in standard tables of food composition, conformance of analyses of foods collected at any one season could not be expected.

Judging from the means of values obtained by analysis, which are accepted as the most accurate estimations of the children's intakes, the fall diets provided greater amounts of all nutrients except total vitamin C[2] than were supplied by the diets in the spring. Some of the differences between fall and spring mean values obviously were not significant and, of course, factors such as increased age, weight changes, and activity could not be evaluated when servings of food were not restricted. However, for the majority of components, the differences were relatively large. This, considering the constancy of higher fall values, indicated that those diets actually contained greater amounts of food factors than those eaten in the spring.

Intakes of protein in the fall were over 12 per cent higher than in the spring; of fat, over 56 per cent greater; and of calcium and phosphorus, over 42 and 14 per cent higher, respectively. In the spring less than one-half of the quantity of vitamin A and approximately one-fourth of the amount of carotene in the fall intake was found in the food eaten by the children. Converted to International Units, the mean total vitamin A activity of the food intakes during the week in April was less than one-third of the value of the diets in November. The mean intakes of thiamine and niacin in the fall were both over 18 per cent higher than the intakes in spring, but intakes of total vitamin C were similar in both seasons.

If the amounts of nutrients in the diets had been determined only by estimation from standard tables, the evaluation for the intakes in the two seasons would have differed considerably for some constituents (Table 4). The calculated values indicated a higher consumption of protein and niacin in the spring, instead of considerably lower intakes, and an equal daily intake of fat instead of an amount less than two-thirds that ingested in the fall. The seasonal differences found by analysis of the diets were not evident from the calculated mean intakes of fat and phosphorus, and the differences in calculated values were much smaller for protein, calcium, and vitamin A. The chemically determined mean amounts of thiamine and riboflavin, corresponded more closely with the calculated values for both the fall and spring diets. Microbiologic determinations of riboflavin provided much higher values than were found by chemical methods in the fall diets, but the results agreed well for the spring diets.

[2] Total vitamin C = ascorbic acid plus dehydroascorbic acid.

*Dietary Adequacy According to Food and Nutrition Board Recommendations*

Dietary allowances are often the only means of assessing diets, and when used, their limitations should be recognized. The selection of a standard does not preclude its acceptance as an absolute requirement. Wiehl (37) has arbitrarily adopted two-thirds of the Food and Nutrition Board recommendations as the minimum standard. Because these allowances were intended to be "objectives toward which to aim in planning practical dietaries" (3), Dann and Darby (38) have suggested the adoption of an optimum and a minimum level in relation to the recommendations: the high recommendation for food intake, represented by the Food and Nutrition Board allowances, would maintain tissue saturation of nutrients; the ingestion of foods according to a lower standard would not produce saturation but would not be accompanied by functional impairment. These authors emphasize (38) another limiting factor: "Since the dietary standard possesses the properties of a mean, its usefulness as a yardstick for assessment of the mean intake of a nutrient by a population is considerably greater than its usefulness when applied to evaluation of the intake of an individual." Imbalance and dietary interrelationships in nutrition have been discussed by Elvehjem and Krehl (39) in an excellent review article.

Data obtained by analysis of the diets of four children in the fall and the same number of children in the spring are given in Table 5 in percentages of the Recommended Dietary Allowances (3), adjusted according to age and body weight and assuming linear relationships. Comparable figures calculated with the estimated amounts of the nutrients in the weighed food intakes are shown in parentheses with each value. The agreement between the data on the age and on the body weight bases in percentages of the allowances provided by the diets was remarkable.

In the fall the diets of the two younger children generally provided greater amounts of all nutrients, except energy and vitamin C, than recommended, both on the basis of age and of weight. The vitamin C intakes were approximately 90 per cent of the recommended allowance. In the spring, the diets of the younger children contained smaller quantities of all nutrients except ascorbic acid than in the fall, but the amounts of energy, calcium, vitamin A, and for two children, thiamine, were less than those recommended.

The same twelve-year-old children (Robert, Donna) participated in the dietary studies in fall and in spring. In both seasons their caloric intakes were less than recommended for their age groups or their body weights. In the fall, however, their diets

TABLE 5

*Mean daily intakes of study children in percentages of Food and Nutrition Board recommendations (3) adjusted for age and body weight**

| SUBJECTS | AGE | WEIGHT | PERCENTAGE OF RECOMMENDATION | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Energy | Protein | Calcium | Phosphorus | Vitamin A | Thiamine | Riboflavin: Chemical determination | Riboflavin: Microbiologic determination | Niacin | Vitamin C |
| | *mos.* | *kg.* | | | | | | | | | | |
| ***Fall*** | | | | | | | | | | | | |
| Robert | 146 | 33.6 | | | | | | | | | | |
| Age basis | | | 82 (79) | 110 (110) | 108 (104) | 131 (130) | 135 (98) | 90 (122) | 153 (129) | 177 | 108 (92) | 72 (83) |
| Weight basis | | | 90 (87) | 119 (118) | 108 (104) | 131 (130) | 143 (103) | 98 (132) | 153 (129) | 177 | 116 (100) | 77 (89) |
| Donna | 147 | 46.2 | | | | | | | | | | |
| Age basis | | | 96 (92) | 127 (124) | 116 (125) | 153 (150) | 156 (89) | 112 (148) | 189 (150) | 237 | 141 (107) | 97 (103) |
| Weight basis | | | 94 (90) | 117 (115) | 107 (115) | 141 (139) | 147 (84) | 104 (137) | 170 (135) | 213 | 130 (99) | 94 (99) |
| Leroy | 102 | 26.8 | | | | | | | | | | |
| Age basis | | | 107 (102) | 134 (129) | 123 (125) | 165 (154) | 171 (101) | 113 (156) | 178 (155) | 221 | 146 (117) | 93 (103) |
| Weight basis | | | 104 (100) | 132 (127) | 123 (125) | 165 (154) | 167 (99) | 113 (156) | 178 (155) | 221 | 146 (117) | 92 (102) |
| Judith† | 98 | 29.0 | | | | | | | | | | |
| Age basis | | | 100 (97) | 124 (118) | 123 (114) | 160 (138) | 137 (78) | 108 (141) | 181 (135) | 192 | 128 (98) | 97 (108) |
| Weight basis | | | 90 (87) | 116 (110) | 112 (103) | 145 (125) | 121 (69) | 98 (128) | 170 (127) | 180 | 117 (89) | 88 (98) |
| ***Spring*** | | | | | | | | | | | | |
| Robert | 152 | 34.0 | | | | | | | | | | |
| Age basis | | | 76 (80) | 96 (108) | 62 (80) | 112 (114) | 46 (65) | 79 (95) | 149 (104) | 119 | 107 (101) | 86 (90) |
| Weight basis | | | 86 (90) | 106 (118) | 67 (87) | 122 (123) | 49 (70) | 85 (102) | 158 (109) | 126 | 116 (103) | 96 (100) |
| Donna | 153 | 48.1 | | | | | | | | | | |
| Age basis | | | 90 (92) | 108 (123) | 78 (106) | 139 (141) | 54 (70) | 94 (112) | 169 (123) | 139 | 115 (113) | 92 (101) |
| Weight basis | | | 89 (90) | 102 (115) | 72 (97) | 128 (130) | 51 (66) | 86 (104) | 161 (117) | 132 | 106 (104) | 89 (98) |
| Ronald | 103 | 24.0 | | | | | | | | | | |
| Age basis | | | 91 (93) | 106 (124) | 85 (112) | 132 (140) | 58 (80) | 88 (111) | 183 (136) | 151 | 102 (108) | 110 (105) |
| Weight basis | | | 97 (100) | 112 (130) | 85 (112) | 132 (140) | 64 (88) | 98 (123) | 196 (146) | 161 | 114 (120) | 116 (110) |
| Judith‡ | 103 | 30.6 | | | | | | | | | | |
| Age basis | | | 89 (88) | 122 (155) | 103 (123) | 145 (163) | 31 (44) | 94 (129) | 179 (159) | 173 | 112 (129) | 93 (93) |
| Weight basis | | | 80 (78) | 113 (143) | 94 (112) | 132 (148) | 28 (39) | 85 (117) | 168 (149) | 162 | 102 (117) | 82 (82) |
| Shelby§ | 100 | 25.4 | | | | | | | | | | |
| Age basis | | | 98 (101) | 119 (129) | 89 (116) | 139 (143) | 54 (72) | 101 (109) | 194 (139) | 152 | 124 (116) | 103 (102) |
| Weight basis | | | 99 (102) | 119 (129) | 89 (116) | 139 (143) | 54 (72) | 101 (109) | 194 (139) | 152 | 124 (116) | 103 (102) |

* Based upon analyses of daily food composites. Comparable values calculated from the weighed intakes of foods are given in parentheses. Adjustments of the Recommended Dietary Allowances on the bases of age and weight assume a linear relationship among consecutive values.

† 6 days.

‡ 2 days.

§ 4 days.

provided more than the recommended allowances of all nutrients determined (Table 5) except for Robert's thiamine intake and the ascorbic acid intakes of both children. In the spring, however, the lower intakes of calories were accompanied by greatly reduced intakes of vitamin A, thiamine, and calcium and slightly lower intakes of protein.

If the diets of the four children had not been analyzed, only the estimated intakes of nutrients would have been available for evaluation in relation to the Recommended Dietary Allowances. Conclusions would thus have been altered by any influence of the differences between the estimated and determined amounts of food constituents shown in the following paper (1) and re-emphasized by the averages given in Table 4. The data based on estimated intakes indicated smaller differences between fall and spring intakes of energy, protein, calcium, phosphorus, vitamin A, and niacin and in most instances the percentages of allowances based on estimated intakes are nearer 100 per cent than are the percentages based on actual amounts determined by analysis. The fact that intakes estimated from the weights of foods eaten referred to standard tables

of food composition did not provide an adequate evaluation of dietary adequacy under specific conditions again was clearly demonstrated.

### *Composition of Blood*

Results of microchemical analyses of blood samples from all children at Holy Family Orphans' Home and from the subjects whose diets were evaluated by analysis and by estimation of food composition are given in Table 6. For all blood constituents determined, the data show only slight differences between means for the total child population and for the children whose diets were analyzed. Means and ranges for all of the children in the fall and in the spring were closely comparable.

The mean hemoglobin values were within the range, 11.6 to 14.5 gm. per 100 cc. of whole blood, given as normal by Mugrage and Andresen (40) for boys and girls from the second to thirteenth year. However, the ranges for all children, 11.0 to 16.5 gm. per 100 cc., may have reflected the increasing hemoglobin levels characteristic of boys at puberty, although from age thirteen girls maintain a fairly even level.

Fall and spring mean values for serum protein were within the range 6.5 to 8.4 gm. per 100 cc. given as normal by Bruckman, D'Esopo, and Peters (41). None of the children had a value below the 6.0 gm. indicative of pathology except in infants (42). However, in the spring, Judith, who discontinued the study because of illness, had a serum protein value of only 6.4 gm. Rennie (42) reported serum protein concentrations of 6.8 to 8.2 gm. for children two and a half to eleven years.

In the fall 38 per cent of the children and in the spring 60 per cent had serum vitamin A levels below 30 mcg. per 100 cc., a level below the normal adult range of 30 to 70 mcg. suggested by Bessey (43). These suboptimal levels for a large proportion of the youngsters were, in part, due to very low intakes of butter in the spring, coupled with reduced intakes of leafy green and yellow vegetables.

Mean vitamin C levels in both fall and spring were well above the 0.7 mg. per 100 cc. considered normal by György (44). However, in both seasons the ranges for all children included some values below the borderline of adequacy given by Youmans (45) as 0.4 to 0.7 mg. per 100 cc.

TABLE 6

*Components of the blood of study children*

| SUBJECTS | AGE | BLOOD* | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hemoglobin | Protein | Vitamin A | Carotenoids | Vitamin C | Alkaline phosphatase |
| **Fall** | | | | | | | |
| | *months* | *gm.* | *gm.* | *mcg.* | *mcg.* | *mg.* | *nitrophenol units* |
| Robert | 146 | 13.6 | 6.9 | 35 | 103 | 1.38 | 4.2 |
| Donna | 147 | 14.6 | 7.2 | 51 | 105 | 1.07 | 5.7 |
| Leroy | 102 | 14.6 | 7.2 | | | 1.55 | 9.3 |
| Judith | 98 | 12.7 | 6.8 | 30 | 104 | 1.06 | 4.9 |
| Study children | | | | | | | |
| Mean | | 13.9 | 7.0 | 39 | 104 | 1.26 | 6.0 |
| All children | | | | | | | |
| Mean | | 13.2 | 7.0 | 31 | 100 | 1.08 | 6.1 |
| Range | | 11.0–16.5 | 6.2–8.0 | 15–55 | 40–160 | 0.2–2.0 | 3–14 |
| **Spring** | | | | | | | |
| Robert | 152 | 14.3 | 6.7 | 28 | 94 | 0.91 | 3.6 |
| Donna | 153 | 14.8 | 6.7 | 41 | 116 | 0.77 | 5.0 |
| Ronald | 103 | 13.4 | 7.0 | 26 | 144 | 1.55 | 8.2 |
| Judith | 103 | 13.3 | 6.4 | 26 | 128 | 1.08 | 5.0 |
| Shelby | 100 | 13.7 | 6.7 | 30 | 107 | 0.71 | 6.1 |
| Study children | | | | | | | |
| Mean | | 13.9 | 6.7 | 30 | 118 | 1.00 | 5.6 |
| All children | | | | | | | |
| Mean | | 13.5 | 6.8 | 29 | 108 | 1.01 | 5.6 |
| Range | | 11.5–16.0 | 6.2–7.6 | 5–65 | 40–200 | 0.2–2.4 | 3–12 |

* Hemoglobin values are given on the basis of 100 cc. whole blood. All other values except serum alkaline phosphatase are given on the basis of 100 cc. blood serum.

In both seasons average serum alkaline phosphatase values were between 2 and 8 nitrophenol units, given as normal by Adamson *et al.* (46). Bodansky (47) gave as normal values 5 to 14 nitrophenol units, averaging 7.3 units, for children two to fifteen years old. For the children at Holy Family Orphans' Home, in both seasons, values as low as 3 and as high as 14 units were found.


## SUMMARY

The nutritional status of approximately one hundred children in an orphans' home in northern Michigan was studied in several ways. For seven consecutive days in the fall (November), the quantity or volume of food prepared at each meal was measured, weighed, or estimated. Records were kept of uneaten food and waste for each meal, and the amounts of foods eaten during the week were computed. In the fall and in the spring (April), all food eaten by four children selected to represent the group was weighed and their intakes of nutrients calculated from standard tables of food composition. Samples representative of the food eaten by the same group of four children in the fall and spring were analyzed for nitrogen, calcium, phosphorus, vitamin A, carotene, thiamine, riboflavin, niacin, and total vitamin C. For all of the children at the Home, data from microchemical determinations of hemoglobin in the blood; protein, vitamin A, carotenoids, vitamin C, and alkaline phosphatase in blood serum; and thiamine and riboflavin in fasting and load samples of urine were available from other papers in this series for comparison.

Comparison of the fall food intake with the amounts of foods recommended in the Family Food Plans for Low Cost Menus for a group of individuals of corresponding ages indicated that a low intake of "other vegetables and fruit" was offset by high intakes of green and yellow vegetables and of milk. The intake of sugar was high but the ingested amounts of eggs, meat, citrus fruit, fats, and flour and cereals were lower than recommendations.

The weighed amounts of foods eaten in the fall by the four representative children corresponded more closely with the recommendations of the Family Food Plans than did the estimate for the total group based on the records of food consumption. Important differences of the spring dietary from that in the fall were the somewhat higher percentages of the recommended amounts of protein foods and the much lower intakes of green and yellow vegetables.

In the fall dietary of the four children the importance of high intakes of milk in compensating for relatively low supplies of some other types of food was demonstrated by provision from this source of only 18 per cent of the total calories but 42 per cent of the protein, 22 per cent of the thiamine, 67 per cent of the riboflavin, 81 per cent of the calcium, and 54 per cent of the phosphorus. Citrus fruit and tomatoes and green and yellow vegetables provided 12 and 59 per cent of the vitamin A and 44 and 17 per cent of the ascorbic acid intakes, respectively. Twenty-five per cent of the vitamin C intake was supplied by potatoes, other vegetables and fruit. Flour and cereals contributed 34 per cent of the energy, 23 per cent of the protein, 36 per cent of the thiamine, 43 per cent of the niacin, 13 per cent of the riboflavin, and 16 per cent of the phosphorus.

On the basis of analyses of samples representative of the food eaten, the fall diets provided greater amounts of all nutrients except total vitamin C, than were supplied in the spring. The fall diets furnished over 12 per cent more protein, 56 per cent more fat, 42 per cent more calcium, and 14 per cent more phosphorus. In the spring the food intakes contained less than one-half the vitamin A and approximately one-fourth the carotene found in the fall. The mean intakes of thiamine and niacin were over 18 per cent higher in the fall than in the spring, but intakes of riboflavin and total vitamin C were similar in both seasons.

Data obtained by analysis of samples of food eaten and calculated from the weighed intakes of foods by the groups of four children in fall and in spring were converted to percentages of the Recommended Dietary Allowances adjusted to age and body weight. In general, percentages of allowances consumed on the bases of age and body weight agreed more closely than might be expected. In the fall the diets of the two children eight years old provided generally greater amounts of all nutrients except energy and vitamin C than recommended, both on the basis of age and of weight. The vitamin C intakes were approximately 90 per cent of the recommended allowance. In the spring the diets of the eight-year-old children contained smaller quantities of all nutrients except riboflavin and ascorbic acid than were found in the fall intakes, but the amounts of energy, calcium, vitamin A, and for two children, thiamine, were less than recommended.

In both seasons the caloric intakes of two twelve-year-old children were less than recommended for their age groups or their body weights. In the fall, however, their diets provided more than the recommended allowances of most of the nutrients determined.

Results of microchemical analyses of blood samples from all children and from the subjects whose diets were evaluated by analysis and by estimation of food composition showed only slight differences between means for the total child population and the means for the individual subjects. Both means and ranges for all of the children in the fall and in the spring compared closely. Hemoglobin values ranged from 11.0 to 16.5 gm. per 100 cc. whole blood, and mean values for serum protein were within the range of 6.2 to 8.0 gm. per 100 cc., both

ranges considered normal. In the fall, 38 per cent of the children and in the spring 60 per cent had serum vitamin A levels below 30 mcg. per 100 cc. Mean serum vitamin C levels in both fall and spring were well above 0.7 mg. per 100 cc., but in both seasons some values were below the accepted borderline of adequacy. For all children serum alkaline phosphatase values were found as low as 3 and as high as 14 nitrophenol units.

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## *Growth-Promoting Powers of Antibiotics*

Additional evidence of significant nutritional powers possessed by antibiotic drugs was reported at the 118th national meeting of the American Chemical Society in Chicago in September. Dr. Joel R. Stern and Dr. James McGinnis, Washington State College, Pullman, described growth-promoting experiments with aureomycin, streptomycin, and terramycin.

The antibiotics' value as growth aids was first evidenced during research on vitamin $B_{12}$, itself a potent growth stimulator in rats and chicks when eaten in extremely small amounts —about fifteen billionths of an ounce a day. It was discovered that animals would grow faster when vitamin $B_{12}$ was supplied by crude fermentation concentrates resulting from antibiotic production than when pure $B_{12}$ was fed. It was decided, therefore, to feed the pure antibiotics themselves to see whether they would stimulate growth more than would the $B_{12}$ alone.

In the studies reported, female rats prior to parturition were fed stock diets. Following birth, they were divided into five groups, the litters reduced to eight pups each, and each group was fed one of five purified diets: without $B_{12}$, with $B_{12}$ supplement, with $B_{12}$ plus streptomycin, aureomycin, or terramycin. At weaning, the females fed the basal diet only had lost an average of 26 gm. each. Those fed the basal diet with $B_{12}$ supplement alone, had lost only 11 gm., while those fed the basal diet plus $B_{12}$ and streptomycin or aureomycin had either lost little weight or actually gained while they were nursing. Based on figures on the amounts used in treating human diseases, about 15 mg. per day of antibiotics would be needed for curative purposes in rats, while to promote growth, only $\frac{1}{4}$ mg. was fed.

A study was also made of the weight of the young of these females. The offspring of the females fed the basal diet averaged 35 gm., while those of the mothers fed the basal diet plus only $B_{12}$, averaged 37 gm., not much of an improvement. However, the young of the females fed the supplements of $B_{12}$ plus antibiotics averaged 43 gm.

In another experiment all females were placed on a $B_{12}$-deficient basal diet when their litters were born. At weaning, the resulting $B_{12}$-deficient pups were divided into three groups. Some were continued on a $B_{12}$-deficient diet, some received the basal diet plus a $B_{12}$ supplement, and the rest were fed diets containing both $B_{12}$ and the antibiotics. The first group, lacking $B_{12}$, grew considerably better than those receiving $B_{12}$, but the third group grew even faster.

The paper pointed out that young rats eat very little before they are weaned, and "it is, therefore, most likely that the greater weight of the young from females fed antibiotics was caused by the milk they received. It is not known whether the milk was of better quality or whether more milk was available to the young while they were nursing."

Thus it was found that the antibiotics "do something to make young rats grow faster," and that the drugs have a beneficial effect on the females while they are nursing. It was also shown that "feeding antibiotic at a low level to the rats for a long time produced no harmful effects that could easily be seen. This indicates that it would be safe to feed the antibiotics to farm animals to produce faster growth in the young. It may even be found desirable to feed antibiotic concentrates to physically retarded children to increase their growth rate."

# Johan G. C. T. Kjeldahl

## His Method For Determining Total Nitrogen[1]

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AT THE mention of Johan G. C. T. Kjeldahl's name, perhaps every dietitian thinks of the course in biochemistry or physiologic chemistry which she took when she determined total nitrogen by the Kjeldahl method. It was probably one of the last experiments in the course, because it was more complex than the others and, for the sake of safety, it was done when the students had had considerable experience in laboratory methods.

The instructor usually was much too busy when Kjeldahl determinations were under way to tell anything about the man who developed the method, the modifications which other investigators had proposed, or the significance of the determinations of nitrogen in the study of normal or pathologic nitrogen metabolism.

Little information is available on Kjeldahl as a man or as a scientist (1–4[2]). He was born in Jagerspris on the Island of Zealand just off the coast of Denmark on August 16, 1849. When he was eighteen years old, his father, a physician, sent him to the University of Copenhagen. After six years' study, he passed the state examination in chemistry, with special honors. He became Barfoed's assistant in the Laboratory of Agricultural Chemistry. Through him, Kjeldahl met B. J. C. Jacobsen who later established the great Carlsberg Laboratory in Copenhagen and who chose him as Head of the Analytical Chemistry Laboratory there. The next year, when Kjeldahl was twenty-seven years old, he was made Director of the Chemical Research Division of the Carlsberg Laboratory, and he held that position until his death in 1900 at the age of fifty-one.

### KJELDAHL'S WORK

Kjeldahl's professional career was a short one—only twenty-five years. However, in that time he did research on a number of subjects, i.e., on enzymes which brought about the formation of sugars (1–3, 6), methods for the determination of sugars (1–3, 6, 7), the optical rotation of plant proteins (1, 2, 8, 9), the carbohydrates of barley and malt (10), the iodometric titration of acids (11), the determination of total nitrogen in organic materials (1–5, 12–15), and the development of a distillation apparatus for nitrogen determination (16).

The young scientists who were associated with Kjeldahl found him a great inspiration. He instilled in his assistants a real zeal for scientific research, and he regretted that the extent of his laboratory work made it impossible for him to conduct any formal classes (1, 2, 4).

In 1883, at the age of thirty-four, he published in four languages (Danish, English, French, and German) his epochal method for the determination of nitrogen (13–15). Eight years later, in 1891, when sixty-two papers pertaining to the Kjeldahl method had been published, Kebler (12) stated, "In the history of analytical chemistry, no method has been so universally adopted, in so short a time, as the 'Kjeldahl method' for the estimation of nitrogen." When one reads Vickery's (17) excellent and comprehensive paper of 1946 on "The Early Years of the Kjeldahl Method to Determine Nitrogen," one is inclined to believe that Kebler's statement of 1891 would be as true today as it was then.

### THE KJELDAHL METHOD

Kjeldahl began his studies on protein analysis in 1881, because he felt that the two older combustion methods of Dumas and Will and of Varrentropp were inadequate, time-consuming, and could be done only by expert chemists and were, therefore, not suitable for routine analyses (1, 2, 4, 17). Furthermore, he wanted a method which could be used for crude mixtures and solutions as well as for pure substances (15, 17).

Kjeldhal's original method was based on the observation that when nitrogenous substances were boiled in sulphuric acid, the nitrogen was converted into ammonium sulphate from which the ammonia can be liberated by the addition of alkali and sub-

[1] Presented at the 32nd Annual Meeting of the American Dietetic Association in Denver, on October 12, 1949, at a session commemorating the birth centennials of Kjeldahl, Pavlov, and Sarah Tyson Rorer.

[2] Since this paper was presented, another article on Kjeldahl has been published—VIEBEL, S.: Johan Kjeldahl (1849 1900). J. Chem. Ed. 26: 459, 1949.

sequent distillation. Briefly, his method was as follows (1, 2, 4, 5, 12–17): (a) Sulphuric acid was added to the sample and the mixture was boiled until it was a clear colorless liquid. (b) The oxidation was carried further by the addition of a few crystals of potassium permanganate, and the completion of the oxidation was indicated by a change in the color of the liquid, from colorless to green. (c) The contents of the flask were cooled and diluted with water. This was accompanied by another change in the color of the liquid from green to brown. (d) Strong sodium hydroxide solution (specific gravity 1.3) was added, as well as a few zinc turnings, and the contents were boiled and the liberated ammonia was collected in a known amount of standard acid. Kjeldahl apparently preferred iodometric titration because of the sharp end-point reached when starch is used as an indicator (11, 17). Because of the frequent contamination of reagents with nitrogen, the need for running blank determinations was emphasized (13–15).

For some substances, Kjeldahl used phosphoric acid or phosphorus pentoxide along with sulphuric acid to decrease the time required for the digestion of the sample (5, 17) but, unfortunately, the above phosphorus compounds etched the digestion flask (5, 13–15, 17). The addition of potassium permanganate was sometimes accompanied by flames, but there was never a loss of ammonia at that stage, even though the reaction was violent and startling to the analyst (13–15).

Kjeldahl achieved his objective in designing a simple method which was suitable for routine use. He was able to do fourteen to twenty determinations a day compared with four which could be done using the method of Will and Varrentropp (13–15, 17). In his original paper, Kjeldahl (13–16) presented the results of his determination of the nitrogen content of trimethylamine, asparagine, uric acid, urea, aniline, indigotin, hippuric acid, caffeine, casein, egg albumin, conglutin, amygdalin, grains, grain extracts, dried yeast, ox muscle, Witte's peptone, quinine, and morphine. At that time, also, he was aware of some of the limitations of his method, and he stated that it could not be used successfully for the determination of nitrogen in cyano-derivatives, nitrocompounds, inorganic nitrates, or in such alkaloids as morphine and quinine. For that reason, it could not completely replace the earlier combustion methods.

### PUBLICATIONS ON THE KJELDAHL METHOD

The Kjeldahl method met with immediate success, and the number of modifications which have been proposed do not so much indicate that that original method was not satisfactory but rather that interest was stimulated among analytical chemists not only in Europe but in the United States (4, 5, 17). Hiller, Plazin, and Van Slyke (5) stated, in 1948, that the papers on the Kjeldahl method which have been published since 1883 "perhaps outnumber those on any other analytical method in the same period of time."

Publications (4, 5, 17) regarding the Kjeldahl method have dealt with: (a) modifications in method and reagents; (b) adaptation of the method so it could be used successfully in the analysis of certain substances; and (c) modifications in the apparatus and especially the design of equipment which made it possible to run several determinations at a time.

Many investigators have tried to decrease the time required for the digestion of the sample and for that reason Wilfarth studied the effectiveness of the oxides of iron, mercury, manganese, bismuth, tin, lead, and copper as catalysts (4, 5, 17). The most effective of these was mercuric oxide, but its use resulted in the formation of a complex ammonium salt which was not decomposed later, and, therefore, led to low values for nitrogen (5, 17). Copper oxide ranked next in its effectiveness as a catalyst and had the added desirable effect of raising the boiling point of the acid which also decreased the time required for digestion of the sample. When copper oxide was used, it was found unnecessary to use either phosphorus pentoxide or potassium permanganate (17).

Gunning observed that the water which was formed as a result of oxidation during the digestion process diluted the acid, and he suggested the use of potassium sulphate to prevent dilution (17). Like copper oxide, potassium sulphate also increased the boiling point of the acid and hence decreased the time required for the digestion of the sample (5, 17).

Another interesting, if not enduring, modification was the one proposed by Stock (18) in 1892, which was the use of a copper flask in place of a glass flask for distillation. There were two advantages in the use of copper flasks: (a) they were not breakable, and (b) with them, it was unnecessary to use zinc turnings to prevent "bumping" (17, 18). Stock reported that "I have adopted a copper boiler because even when using the strongest bolt-heads I could procure, the fractures [of the flasks] amounted to 25 per cent although zinc was used to lessen the 'bumping.'" Copper flasks are no longer necessary because we can obtain much more durable glassware than was available in 1892 (17).

S. W. Johnson, an American, was one of the more successful chemists to build and construct apparatus which made it possible to run a whole series of determinations at a time (17).

Nitrogen determinations have been indispensable in the extensive studies which have been made on the protein requirement of normal human subjects and also in determining the need for and effect of markedly increased protein and/or amino acid intake in the dietetic treatment of patients who have suffered extensive burns.

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## *Lysine to Fortify Bread*

Bread fortified with synthetic lysine caused rats to grow at a substantially greater rate than did control animals fed the same type of bread without lysine fortification. Also, rats receiving the basal bread diet never attained weights equal to those of animals receiving the additional lysine.

Wheat protein is known to be relatively low in lysine and, as a result of milling, the proteins in wheat flour are even more deficient in this amino acid. Experiments have shown that synthetic lysine added to flour undergoes only small losses when baked in bread. A diet comprising adequate amounts of meat, milk, cereals, eggs, and bread contains all the lysine needed to insure proper nutrition.

Nevertheless the promising growth results with rats, suggest that bread fortified with synthetic lysine deserves serious consideration if it should ever become necessary to improve human nutrition by an increased intake of this essential amino acid.—*Abstract from a paper given at the 118th national meeting of the American Chemical Society in September in Chicago by Hans R. Rosenberg and Edward L. Rohdenburg, Biological Laboratory, Organic Chemicals Department, E. I. duPont deNemours and Co., Inc., New Brunswick, New Jersey.*

# Editorial

### HISTORICAL ACQUISITIONS OF THE A. D. A. LIBRARY

The latter part of July, the A.D.A. Library became the recipient of five rare historical volumes by Sarah Tyson Rorer, the United States' first dietitian. The donor was Mabel Dulon Purdy, pupil and associate for many years of Mrs. Rorer.

It will be recalled by dietitians attending the A.D.A. convention in Denver last fall that the one hundreth anniversary of Mrs. Rorer's birth was commemorated at a special meeting in a paper written by Mary P. Huddleson, former Editor of this JOURNAL. This paper was published in the April issue of the JOURNAL this year, and in it, Mrs. Huddleson acknowledges with gratitude the assistance Mrs. Purdy gave her in preparing this tribute.

The books which Mrs. Purdy contributed will form the nucleus of what we hope will be an ever-growing collection of historical incunabula concerning nutrition and dietetics. The titles of the works received are: *New Ways for Oysters* and *Quick Soups*, both published in Philadelphia in 1894, and *New Salads*, which appeared three years later. In addition, bound volumes, Numbers 1 and 2, 1893 and 1894, of Mrs. Rorer's own magazine, *Household News*, were received. This publication was later, in 1897, absorbed by the *Ladies' Home Journal*.

With her gift Mrs. Purdy sent a short statement that the books were being given "in grateful and reverent memory of America's first dietitian—Sarah Tyson Rorer." The Association has accepted with gratitude Mrs. Purdy's gift; the books will be treasured and kept with the care and respect which they deserve.

### MARY SWARTZ ROSE FELLOWSHIP RECIPIENT

For the second year, the Awards, Scholarship, and Loan Fund Board of the American Dietetic Association has awarded the Mary Swartz Rose Fellowship to Pearl Jackson. This fellowship, established last year, is made possible through a grant from the Nutrition Foundation, Inc., given for the purpose of recognizing the work of dietitians in promoting better nutrition. It is named after Mary Swartz Rose, one of the true pioneers in the field of education in nutrition and dietetics, in the belief that it would gain inspirational value if named in honor of such an acknowledged leader and pioneer.

Miss Jackson, who now becomes both the first and second recipient of this fellowship, is pursuing work leading to a doctor's degree in food administration at Iowa State College, Ames.

Provisions of qualification for the Mary Swartz Rose Fellowship are as follows:

Applicants must (a) be members of the American Dietetic Association, (b) have ranked in the upper quartile of their respective graduating classes, and have majored as under-graduates in a field closely related to that in which the fellowship is sought or have gained equivalent training later, and (c) show promise of making a valuable contribution to the profession.

The recipient of the fellowship is selected by the Awards, Scholarship, and Loan Fund Board of the American Dietetic Association, a six-member board appointed by the Association's President, subject to the approval of the Executive Board. The President and President-Elect of the Association are ex-officio members of this board.

Nominations for the Mary Swartz Rose Fellowship for 1951, which carries with it $1000, may now be made, the closing date for such nominations this year being March 15, 1951. By that time all supporting recommendations should be in the hands of the Awards, Scholarship, and Loan Fund Board. The award will be made and the candidate notified of the selection at a later date. Unsuccessful candidates will be notified at the same time.

### NEW A. D. A. STAFF APPOINTMENT

The Executive Board announces the appointment of Dorothy Weber as Director of the Placement Bureau. She will fill the place of Verna Ansorge McKinley, who resigned to make her home in Appleton, Wisconsin, where her husband has established a business.

Miss Weber is a graduate of Iowa State College, Ames, having majored in dietetics. Following her internship at the University of Minnesota Hospitals, she served as Assistant Administrative Dietitian at St. Luke's Hospital, Chicago, for three years. She then returned to Iowa to take graduate work at the State University of Iowa, Iowa City, where she received a master's degree in commerce with specialization in personnel administration. While in Iowa City, she also acted for one year as graduate assistant in home economics, teaching elementary food preparation to undergraduate students. More recently, she has been Teaching Dietitian, Rhode Island Hospital, Providence.

Miss Weber's training and experience both in di-

etetics and personnel administration and her enjoyment in working with people make her unusually well qualified to assume the responsibilities of directing the Placement Bureau.

### RUTH ATWATER

Ruth Atwater died in Washington, D.C., on August 22. She had had heart trouble for a little over two years and for the past year and a half had lived quietly in Washington.

Miss Atwater was Director of the Home Economics Department of the National Canners Association in Washington, from 1927 until she joined the editorial staff of *What's New in Home Economics* in September, 1943. There were not many home economists in business in 1927, and she helped to establish high standards for that group. She worked diligently when she first went to Washington to put new life into the small local dietetic association, for she enthusiastically believed in the dietetic profession, attended every annual convention, and gave freely of her time and organizational ability to both local and national projects. She served as Second Vice-President of the American Dietetic Association from 1933 to 1935 and Chairman of the Nominating Committee in 1935–36. She was a friendly person and had a very wide acquaintance in both the dietetic and the home economics associations.

## New Appointments, Veterans Administration

The following hospital appointments of dietitians, not previously announced, have been made by the Veterans Administration:

| Name | Position | Location |
|---|---|---|
| | *Boston Area* | |
| Sonya M. Gambera | Staff Dietitian | Brooklyn, N. Y. |
| Maryellen Imboden | Staff Dietitian | Brooklyn, N. Y. |
| Margaret E. Kershaw | Staff Dietitian | Togus, Me. |
| Esther Krantz | Staff Dietitian | Buffalo, N. Y. |
| Ruth L. Ludtke | Head Dietitian | Montrose, N. Y. |
| Elizabeth Shanahan | Staff Dietitian | Framingham, Mass. |
| Florence Smith | Staff Dietitian | Montrose, N. Y. |
| Esmene Vlatos | Staff Dietitian | Bronx, N. Y. |
| Elizabeth Winston | Staff Dietitian | Togus, Me. |
| | *Washington, D.C., Area* | |
| Mary A. Byron | Head Dietitian | Lyons, N. J. |
| Helen Corsino | Staff Dietitian | Ft. Wayne, Ind. |
| Ernestine Musselwhite | Staff Dietitian | Kecoughtan, Va. |
| Eleanor Petrarca | Staff Dietitian | Aspinwall, Pa. |
| Grace Smith | Head Dietitian | Washington, D. C. |
| Dorothy Stewart | Staff Dietitian | Butler, Pa. |
| | *Atlanta Area* | |
| Juanita Dykes | Staff Dietitian | Atlanta, Ga. |
| Mary M. Littleford | Staff Dietitian | Mt. Home, Tenn. |
| Mary M. Ward | Staff Dietitian | Columbia, S. C. |
| | *St. Louis Area* | |
| Alyne Brice | Staff Dietitian | Houston, Tex. |
| Ellen Hauke | Staff Dietitian | Topeka, Kans. |
| Alberta P. Hendricks | Staff Dietitian | Topkea, Kans. |
| Lillian L. Kettler | Staff Dietitian | Ft. Logan, Colo. |
| Pauline Ponting | Staff Dietitian | Big Spring, Tex. |
| | *Ft. Snelling, Minnesota, Area* | |
| Marianne Anderson | Staff Dietitian | Hines, Ill. |
| Margaret Biedron | Staff Dietitian | Downey, Ill. |
| Eloda Gust | Staff Dietitian | Hines, Ill. |
| Velma P. Layman | Staff Dietitian | Sheridan, Wyo. |
| Elizabeth Pritchett | Staff Dietitian | Wood, Wis. |
| Patricia Riesner | Staff Dietitian | Wood, Wis. |
| Wilma J. Rush | Staff Dietitian | Saginaw, Mich. |
| Merwyn Schmidt | Staff Dietitian | Hines, Ill. |
| Carol B. Stegner | Staff Dietitian | Minot, N. D. |
| Glenette Zook | Staff Dietitian | Hines, Ill. |
| | *San Francisco Area* | |
| Patricia Campbell | Staff Dietitian | Los Angeles, Calif. |
| Shirley M. Chaska | Staff Dietitian | Livermore, Calif. |
| Burniece Kinder | Staff Dietitian | Long Beach, Calif. |
| Fae Larson | Staff Dietitian | Long Beach, Calif. |
| Frances Lilly | Staff Dietitian | Long Beach, Calif. |
| LaPreal B. Loveless | Staff Dietitian | Los Angeles, Calif. |
| Frances McRae | Staff Dietitian | Tucson, Ariz. |
| Velma F. Walker | Staff Dietitian | Livermore, Calif. |

# Current Comment

## DIETETIC INTERNS SAVE TIME[1]

DOROTHY STEWART

*Dietetic Intern, Veterans Administration Hospital, Bronx, New York*

As dietetic interns at the Veterans Administration Hospital, Bronx, New York, we are part of one of the government's biggest time-saving programs. Contrary to popular opinion that the government creates red tape, attempts are actually made, through its work simplification program, to eliminate bottlenecks and lost effort—that is, to find a "better way" of doing a job. Interestingly enough, the program had its origin in the Bureau of the Budget, and it was then installed in key government agencies including the Post Office Department, the Bureau of Internal Revenue, and the Veterans Administration. It is a program that enables each supervisor to apply the principles of management engineering to the problems of his own unit.

At our hospital, the dietetic interns along with the staff dietitians and supervisors from other departments attend a series of work simplification conferences given by the hospital's training officer. At the training classes we learn the techniques of work simplification, which means the use of its three basic tools. These are: the Work Distribution Chart for analyzing the distribution of work in a unit; the Process Chart to show the sequence of work; and the Work Count to show the volume of work. To qualify for certification in the course, the trainee must select a problem that exists in her own unit and work out an improvement. In this way she receives practical experience under supervision and at the same time may make a valuable contribution to the hospital.

Work simplification, however, is a continuing program and does not end with training and the submitting of one study. The supervisors seek constantly to improve the work methods in their units. They work out new procedures, submit them for approval, and finally, but most important, put them into operation.

### IMPROVEMENTS SUGGESTED BY INTERNS

In the three years that the dietetic interns have participated in the program, they have submitted more than fifty work simplifications, amounting to savings of approximately 12,000 manhours a year. In most cases the changes have been simple, but they might not have been made if the conditions had not come to the attention of a person who was "work simplification conscious."

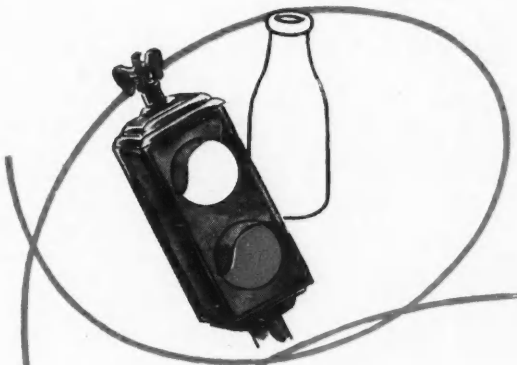
The savings per operation may appear to be too slight to be important, but when calculated on a yearly basis, the figures take on new importance. It is surprising to realize that 5 min. saved in a day will amount to a gain of 30.4 hr. in a year. For example, by moving a telephone to a stand between the supervisor's and secretary's desks, it was found that 40 seconds could be saved on each call. In itself, the saving is unimpressive; however, when thirty-five calls are received at that office daily, the savings amount to 23.3 min. a day and in a year to $141\frac{3}{4}$ manhours.

In another case, it was noted by a dietetic intern that in the cafeteria line in one of the dining rooms, too long a line was forming at the place where the silverware and napkins were taken. After an analysis had been made by the prescribed method, the napkins were placed in front of the silverware, reducing the number of motions needed to pick up both items from six to four. This change resulted in a saving of 10 seconds for each individual, amounting to a daily saving in manhours of 1 hr. 40 min. and a total yearly saving of $608\frac{1}{3}$ hr. for the 600 personnel eating in the dining room. This saving is important not only from the standpoint of the employee's time, but also in the resulting improved rate of food service.

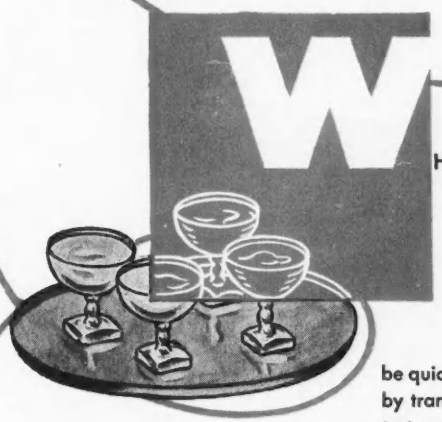
In still another instance, a yearly gain of 912 manhours resulted from a change in the working location of a cafeteria employee. By simply working from the opposite side of the table, he could dish up desserts and place them on the cafeteria counter much more quickly and easily. The new arrangement eliminated three motions and a semi-circular movement of the body, cutting the serving time employed in the process to one-half.

Sometimes the saving is due to the installation of equipment which may be relatively inexpensive. While working in the bake shop, one of the dietetic interns saw the need for an improved technique in sifting the 500 lb. flour used weekly. Through her work simplification training, she was able to show

[1] Published with the approval of the Chief Medical Director. The statements and conclusions published by the author are the result of her own study and do not necessarily reflect the opinions or policy of the Veterans Administration.



# GIVING MILK THE GREEN LIGHT!

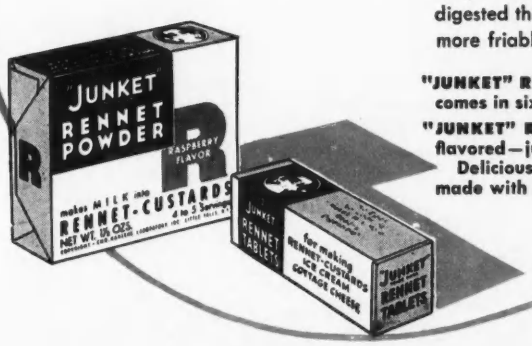


WHEN MILK IS A VITAL PART of the daily regimen, such as in infancy, childhood, pregnancy, and for gastro-intestinal, postoperative and geriatric conditions—a serious aggravation of the dietary problem may occur for those patients who (either for physiologic or psychologic reasons) are unable to ingest this essential nutrient.

In such cases, the *red light* of milk refusal may be quickly changed to the *green light* of eager acceptance—by transforming the liquid milk into deliciously flavored, tasty rennet desserts, through the medium of rennet powder or household rennet tablets.

Young and old alike relish these temptingly smooth custard-like desserts which incorporate the uncooked milk — with all nutritional factors unchanged — into a variety of delicious, colorful rennet desserts. They're so simple to prepare—and are more easily digested than milk itself, because of the softer, more friable curds formed in the stomach.

*"JUNKET" is the trade-mark of Chr. Hansen's Laboratory, Inc., for its rennet and other food products, and is registered in the United States and Canada.*




**"JUNKET" RENNET POWDER**—already sweetened—comes in six popular flavors;

**"JUNKET" RENNET TABLETS** are not sweetened or flavored—just add sugar and flavor to taste.

Delicious, highly acceptable rennet desserts may be made with either.

**"JUNKET" BRAND FOODS**
DIVISION
Chr. Hansen's Laboratory, Inc.
LITTLE FALLS, N. Y.
N-100

how the installation of an inexpensive, hand-operated hamper would result not only in a time-saving of 140⅓ manhours annually, but also a reduction in physical effort on the part of employees who formerly sifted the flour in a large sieve, a tiring process which had to be repeated many times.

The dietetic interns, as potential first-line supervisors, now have at their disposal the knowledge and means for making a practical analysis of the problems they will encounter and improvements they will wish to make. They can present facts and figures that cannot be ignored. Already the contributions that they have made give testimony to the value of the work simplification program.

### *New Calorimeter Measures Heats of Protein Reactions*

Announcement was made at the 118th national meeting of the American Chemical Society in Chicago last month of the development at Yale University of a new calorimeter which reflects temperature changes as slight as five millionths of one degree. Developed under a grant from the American Cancer Society, this calorimeter will enable detailed study of the heats of protein reactions.

Dr. Julian M. Sturtevant pointed out in his paper that "cancer is a condition of abnormal growth and reproduction of certain cells. There can be little doubt that any degree of comprehension of these abnormal processes, as well as of the processes of normal growth and reproduction must await a tremendous increase in our knowledge of the proteins which constitute the bulk of the material, aside from water, in the living cell. The accumulation and interpretation of information concerning the heats of the reactions undergone by these substances is but one phase of the vast scientific effort at present being concentrated on proteins."

The new instrument was worked out particularly for measuring the heat changes which occur in reactions in solutions of proteins, but the method employed can be readily adapted to other classes of substances. With this instrument, Dr. Sturtevant said, "it becomes possible to evaluate a heat change as small as 0.001 calorie per cubic centimeter of solution, with reactions taking as long as several hours to reach substantial completion." Only 25 cu. cm. (about 1 oz.) of solution are required for each experiment. This amount of heat would raise the temperature of a cubic centimeter of water only 0.0018°F. The temperature measuring device in the apparatus responds to changes as small as five millionths of a degree.

Dr. Sturtevant explained that all chemical reactions take place with the evolution or absorption of greater or lesser amounts of heat which may be measured in a calorimeter. Reactions such as the combustion of coal or oil evolve large amounts of heat and are therefore of great practical importance. Other reactions involve only small heat changes which in themselves are of no great importance from a practical point of view, but which may nevertheless be of considerable significance in helping investigators to understand the nature of the processes taking place.

### *Diet and Body Weight*

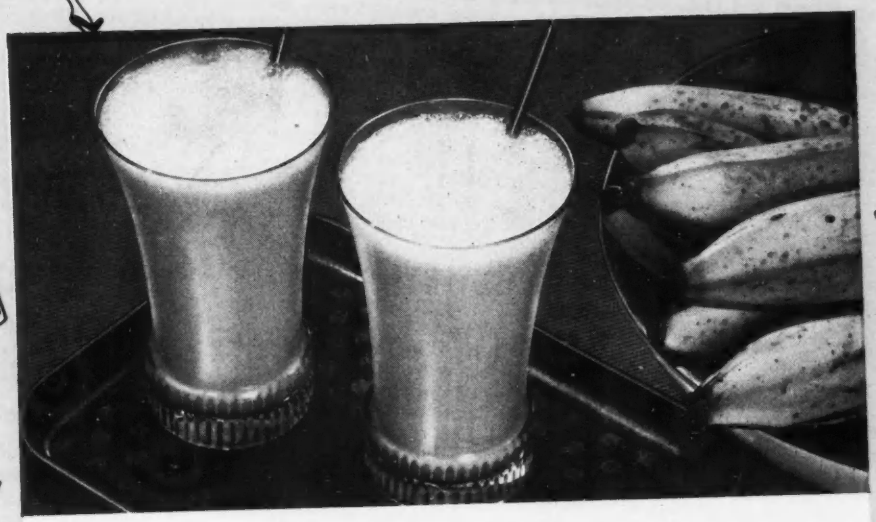
The human body does not violate the law of the conservation of energy. A patient would not gain more than the weight of the nutrients he absorbed; in fact, he would undoubtedly gain less because of elimination of urine and feces. An undue gain of weight in pregnancy could be caused by reorganization of preformed water. That is, fat, or adipose tissue (with about 10 per cent preformed water) may be mobilized to aid in the formation of the growing tissue (with about 75 per cent preformed water) of the fetus. Even in this case, the source of this preformed water must be either water *per se* or water in foodstuffs. Thus the weight gain would be accounted for in the total weight of nutrient intake. In congestive cardiac failure an excess of water and sodium is retained in the tissues. Therefore, an accurate balance study should show the cause for excess weight gain.

Weight loss is proportional to caloric intake. It is possible to calculate a caloric intake to give a predicted weight loss over a period of time and to feed such a diet. Newburgh has shown that apparent failure to lose weight on a carefully controlled regimen is due to retention of water. If the diet is continued, there will be a rapid loss of weight when there is a depletion of this retained water. "Body tissue can be accumulated in only one way. The inflow of energy must exceed the outflow."—*From Queries and Minor Notes, J.A.M.A. 143: 1381 (August 12), 1950.*

CHIQUITA BANANA SAYS:

For two great foods in one

# BANANA MILK SHAKE



Easy to make

For milk shakes—bananas fully ripe flecked with brown.

## How to make BANANA MILK SHAKE

**1 fully ripe banana** **½ cup (8 oz.) COLD milk**

Peel banana. Slice or break into container of an electric mixer. Add milk and mix until creamy. Serve immediately. Makes 1 large drink (10 to 12 ounces) or 2 medium-sized drinks (5 to 6 ounces each).

When using a mixer which does not cut up and crush fruit, mash the banana before placing into container of mixer.

For a COLDER drink: Add about 2 tablespoons of crushed ice before mixing.

For a RICHER, SWEETER drink: Add about 2 tablespoons of ice cream before mixing.

Banana Milk Shake separates when allowed to stand...therefore serve immediately.

Banana Milk Shake is a "pep restorer"...good for everyone. It is of special value in post-operative and convalescent diets. The Banana Milk Shake contains approximately 260 calories.

**VARIATIONS**

**Banana Egg Nog:** Before mixing Banana Milk Shake, add 1 egg.

**Banana Malted Milk Shake:** Before mixing Banana Milk Shake, add 2 to 3 tablespoons (½ to ¾ ounce) malted milk powder.

**Banana Chocolate Milk Shake:** Before mixing Banana Milk Shake, add 1 to 4 tablespoons (½ to 2 ounces) chocolate syrup.

**USE FULLY RIPE BANANAS ... PEEL WELL FLECKED WITH BROWN**

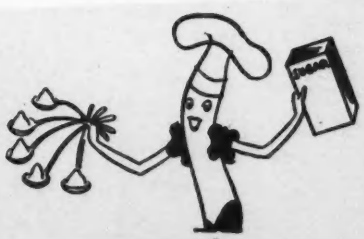
**Home Economics Dept., UNITED FRUIT COMPANY, Pier 3, N. R., New York 6, N. Y.**

Easy to take

Bananas give you Vitamins Minerals Fruit Sugars

Good to drink

... and don't forget—
5 teaspoons of fruit sugar
in every ripe banana



For bland diets, fruit diets, high carbohydrate diets—Bananas

# Book Reviews

**School Meals.** Prepared for the School Food Service Association by a committee, Constance C. Hart, Chairman. Pp. 160. Paper. Available from Constance Hart, 13 Fitzhugh Street South, Rochester, New York. Price $2.50.

The lunchroom manager will find that this comprehensive manual gives unlimited assistance for planning menus, purchasing, or food preparation. The nutritional needs of children are explained briefly, and the contribution of the Type A lunch toward daily food requirements is emphasized.

All lunchroom employees who work with foods should be familiar with the many practical hints given. Care and utilization of all foods, conservation of nutritional values, and suggestions for adding interest to the meals are included. A brief section discusses hints for serving and gives generalized menu ideas. Extensive lists of foods for the school lunch are included, as well as specific ideas for sandwiches and the use of ground meats.

The section on "Suggestions for School Lunch Menus" contains an exhaustive list of Type A meals. Menus are segregated under "main dish" headings—the various meats, poultry, fish, eggs, cheese, soups, and sandwiches—and this well illustrates the possibilities for unlimited variety. The size of the portion is shown for each item of each menu. The advisability of including a fruit juice or tomato juice with each meal could be questioned. Many children would reject such repetition, while others would have difficulty in consuming this quantity of liquid, especially when soup is served. There are plans for group service and several suggestions for banquet menus.

An excellent food chart indicates the quantities to be purchased for 100 school lunch meals and the size of each serving portion. Parallel with the suggested menus for four weeks are the market orders and the work plans.

Forty pages of recipes standardized for fifty portions are included. The total yield and the size of the portion is shown. Since this portion size frequently varies from that given in the menus, adjustment would be required.

Although the major part of this material has been previously published, such a compilation will prove to be a decided advantage. Page numbers should be given in the index.—*Ann R. Brownlie, Coordinator of Lunchrooms, Portland Public Schools, Portland, Oregon.*

**Rector's Naughty 90's Cook Book.** By Alexander Kirkland. Garden City, N. Y.: Doubleday & Co., Inc., 1949. Cloth. Pp. 247. Price $3.50.

Magenta, deep purple, emerald green, and gold catch your eye as you glance at this delightful book. Opposite these bright, chapter-heading pages are pictures and stories of the fabulous persons of the era when Rector's was New York's most dazzling establishment.

Alexander Kirkland, the author, is a Broadway star far too young to have known the Rector's of this book. But from newspapers, archives, and old books, Mr. Kirkland has assembled wonderful gossip and anecdotes, profiles and photographs of such beauties as Anna Held, Maxine Elliott, Lillie Langtry, Lillian Russell, and the great lady, Ethel Barrymore. Rich food and fine wines were the delight and distress of these beauties for, as the story says, "Lillian Russell was quite aware that her four-figure salary depended on her retaining one figure—and one chin."

But, here is her favorite lobster cream canape à la Lillian Russell. Among the four hundred other recipes, most of them hitherto unpublished, are: Gentleman Jim Corbett's pocket steak (a thick steak stuffed with oysters and broiled; filet of sole Marguery à la Diamond Jim Brady; Anna Held's favorite breast of chicken; and dozens of other rich, exciting dishes. Twelve sections from "Hors D'Oeuvres" to "Wines" present recipes and reminiscences which will make this book "a conversation piece for your parlor which doubles in brass in the kitchen."—*Virginia Monahan Bayles, Boulder, Colorado.*

**Nutrition and Diet Therapy.** 10th edition. By Fairfax T. Proudfit and Corinne Hogden Robinson. New York: The Macmillan Co., 1950. Cloth. Pp. 950. Price $4.

This edition of *Nutrition and Diet Therapy* is presented as a text for students in nursing and as a useful reference for the college student of dietetics, the nutritionist in public health, the dietitian, and the physician.

Significant additions and changes were made in this edition. The section on diet therapy was almost entirely rewritten. Besides the principles of the dietary modifications for the pathological conditions, the contributing factors such as symptoms, etiology, and clinical findings are given. The diet outlines were made more useful by listing *foods allowed* and *foods to avoid* in parallel columns for ready comparison. A summary of the nutritive value of the basic list of foods facilitates estimation of the actual food intake.

The broader treatment of diet in surgical conditions, the five-stage bland diet for peptic ulcers, the liberalized fat allowances in diets for liver disease, and the comprehensive treatment of low-sodium diets are noteworthy features. The simplified calculations for diabetic diets are presented as they were compiled by the joint committee of the American Dietetic Association, the American Diabetes Association, and the Diabetes Branch, U. S. Public Health Service.

Requirements for normal nutrition have been revised in accordance with the 1948 Recommended Dietary Allowances. The subject matter was critically examined so that it could be used with the new *Manual for Teaching Dietetics to Student Nurses* prepared by the American Dietetic Association. The new chapters, "Food and Its Relation to Health" and "Growth of the Science of Nutrition" replace the introductory material of the previous edition. More extensive treatment is given to proteins, amino acids, minerals, and vitamins. Practical suggestions for safe food practices have been added.

New tables in the Appendix include a shortened method of dietary analysis, a convenient list of food equivalents for calculating measured diets, a table for the computation of low-sodium diets, a table with cholesterol content of foods, and height-weight tables for all age groups.

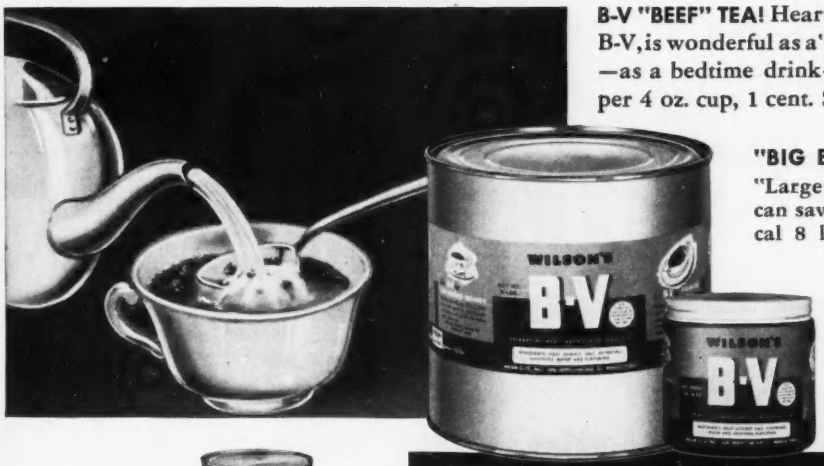
For the student nurse this book should prove stimulating. Examples within her experience are given to make the subject matter informative and motivating. Frequent reference to the student nurse, her application of the material given, and objectives she should have in reading it should make the subject matter meaningful to her. The questions at the end of each chapter are not just factual questions but thought-provoking questions and problems for individual activity.

The data presented seem to be accurate and as up-to-date as can be found in a book which deals with a changing science.—*Berdena Rosenow, University of Kansas Medical Center, Kansas City, Kansas.*

# BUY B-V favorite meat extract with BIG USERS of gravies, soups, "beef" tea

**GALLONS OF B-V GRAVY.** Using the simple B-V recipe you can make gallons of rich brown gravy without meat or meat drippings. Approximate cost per ¼ cup (2 oz.) serving, 1 cent. See offer below and mail coupon today.

**GOOD SOUPS MADE EASY!** With B-V, America's leading meat extract, you can make rich, wholesome soups any time and in any quantity. Also, bouillons. Approximate cost per 8 ounce serving *noodle* soup, 3 cents.




**B-V "BEEF" TEA!** Hearty "beef" tea, made with Wilson's B-V, is wonderful as a "pick-me-up"—for lunch or supper—as a bedtime drink—for convalescents. Approx. cost per 4 oz. cup, 1 cent. See offer below.

**"BIG BERTHA" Tin or "BIG BOY" Jar**

"Large quantity" users of Wilson's B-V can save money by ordering the economical 8 lb. "Big Bertha" tin or 20 ounce "Big Boy" jar. Order Wilson's B-V from the Wilson salesman or your jobber. Or write Wilson & Co., Inc., U. S. Yards, Chicago 9, Ill.

*B-V is a delicious blend of concentrated meat extract and selected vegetable flavors*

**You just can't beat a Wilson Canned Meat**

Wilson's Canned Meats packed especially for institutions are steadily growing in popularity. Two favorites are an 8 lb., 8 oz. tin of Wilson's Certified Tamales, with sauce, "64 Count" open ends, and a 5 lb., 12 oz. tin of Wilson's "Meaty and Mighty Good" Corned Beef Hash. Wilson's Canned Meats in "home size" tins are also available.

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**To Buyers for Institutions of All Types**

Wilson & Co., Inc.
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Please send your new FREE book of tested B-V *large quantity recipes* for institution use, and a Free Sample of B-V, America's leading meat extract.

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*City*.....*Zone*.....*State*.....

**Citrus Products. Chemical Composition and Chemical Technology.** By J. B. S. Braverman. New York: Interscience Publishers, Inc., 1949. Pp. 382. Cloth. Price $9.

*Citrus Products* is a technical book which gives in compact form a complete picture of the subject for students of the citrus industry.

The introduction contains a brief history, a taxonomic chart showing the classification of the principal species of Citrus, Fortunella, and Poncirus and a concise description of cultivation, marketing, and citrus fruit diseases.

Part I deals with the chemical composition of the components of the chief varieties of citrus fruit. Coloring methods are described, and Mr. Braverman brings out the established fact that color alone is by no means a reliable indication of maturity as is so commonly believed by the consuming public. Of special interest to the nutritionist and dietitian is the section devoted to vitamins.

Part II on chemical technology describes new developments of the industry. The preparation of fruit for processing, extraction of citrus oils, and methods of processing juices are given in detail. The methods of preservation with emphasis upon chemical preservatives is most informative and of particular note to the food service person. The latter portion of this section gives the manufacture of miscellaneous citrus products.

The appendix carries standard specifications for straight juice and concentrates as accepted in different countries. Throughout the book there is extensive reference material.

With the increasing popularity of citrus products, this book fills a need for those working in the industry and will serve as an excellent reference book for the nutritionist and dietitian.—*Helen E. Underwood, Head, Department of Restaurant and Hotel Management, Florida State University, Tallahassee.*

**Medical Management of Gastro-Intestinal Disorders.** By Garnett Cheney, M.D. Chicago: The Year Book Publishers, Inc., 1950. Cloth. Pp. 478. Price $6.75.

Dr. Cheney is Clinical Professor of Medicine at Stanford University Medical School. He has written this book for "the physician in general practice and for the busy internist," to aid them in the diagnosis and treatment of gastrointestinal disorders. Insofar as this reviewer is competent to judge, this has been thoroughly done with great clarity of writing and economy of words.

The first and shortest section of the book deals with the examination of the patient, and a description of the laboratory procedures which may have to be used in arriving at a diagnosis. The bulk of the book enumerates, chapter by chapter, common complaints, beginning with the mouth and including the entire gastrointestinal tract, and describes the diseases of which the complaint may be a symptom, the methods needed for arriving at a diagnosis, and the treatment. The emphasis, particularly in the section dealing with the examination of the patient, is on the individual as a whole. Considerable reference is made throughout the book to the frequency with which gastrointestinal complaints and findings may be of psychoneurotic origin.

Of interest particularly to the dietitian are the diets used by Dr. Cheney for the various disorders described in the book. These include non- and low-residue regimens useful in many types of gastrointestinal disorders; diets low in fat for gallbladder disease; a high-protein, high-carbohydrate, low-fat diet for liver disease; a high-fat formula and a high-protein, low-fat formula, which may be used either as between-meal supplements or as tube feedings; diets in allergy; and ulcer diet regimens. With some exceptions, these follow the conventional usage. They are clearly stated with a minimum of do's and don't's, so often confusing to both the doctor and the patient. The formula feedings are calculated for protein, fat, carbohydrate, minerals, and vitamins; and for all nutritionally inadequate diets warning is given that these must be supplemented with concentrates if they are to be used for any length of time.

It is surprising that Dr. Cheney continues to use a low-fat diet in liver disease, when Patek has clearly shown that as long as the protein intake is high, the fat intake does not seem to interfere with recovery. It is so much easier for the patient to eat a high-protein diet if the fat is there to make it palatable. The elimination diet for allergy is even more exclusive of common foods than the well-known Rowe diets. It includes such unusual foods as poi, papaya, maté, palm hearts, and bamboo shoots. Dr. Cheney reports good results with this diet.

The only striking difference from established practice in diet therapy is in the ulcer regimen. On the theory that the normal stomach does not develop ulcer because it produces an anti-pepsin factor, tentatively called vitamin U, Dr. Cheney feeds his ulcer patients, in addition to what might be called a liberal convalescent ulcer diet, large quantities of foods rich in this so-called vitamin U. These consist mainly of fresh, raw green vegetables such as spring cabbage, lettuce, and celery. Accordingly, the diet contains not only these foods, both in their raw state or expressed as juice, but also such unorthodox foods for the ulcer diet as ripe olives, tomatoes, green peppers, bouillon, and clam broth. Dr. Cheney warns that this diet is still in the experimental stage. However, he has observed beneficial effects in seventy-one out of seventy-five patients, and a shortening in the time of healing.

A so-called "limited peptic ulcer diet" is also given, but here there is not enough detail to aid the general practitioner who has not quite the courage of Dr. Cheney's convictions.

This book has value for the dietitian in that it presents clearly the medical findings in many conditions for which she will carry the responsibility of the dietary care.—*Henderika J. Rynbergen, Assistant Professor of Sciences, Cornell University-New York Hospital School of Nursing, New York, New York.*

**A Primer for Diabetic Patients.** By Russell M. Wilder, M.D., Ph.D., F.A.C.P. Philadelphia: W. B. Saunders Company, 1950. 9th edition. Pp. 200. Cloth. Price $2.25.

## *Edible Oils from Sunflower Seeds*

At North Dakota Agricultural College, Fargo, laboratory tests of the seeds of the Advance and Sunrise varieties of sunflower have shown that the oil content is approximately 30 per cent of the total weight of the seeds and that this oil is approximately 75 per cent linoleic acid, a major constituent of edible oils.

The sunflower seed oil is less subject to flavor reversion than some other edible oils, and thus could find good use where flavor reversion is a problem. Among the suggested uses for sunflower seed oil are: margarines, lard substitutes, salad dressings, French-frying of foods, oil packing of foods, and carrying agent for pharmaceuticals.—*Abstract from a paper by Ingmar Sollin, Pennsylvania State College, and Dr. Carl O. Clagett, North Dakota Agricultural College, presented at the 118th national meeting of the American Chemical Society in Chicago in September.*

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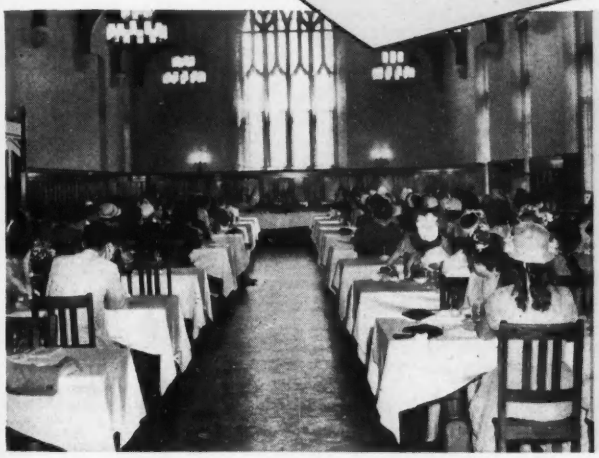

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# Current Literature

*Contributed by Janette C. Carlsen and Ethel M. Miller, The Johns Hopkins Hospital, Baltimore; Hermia M. Handt, Veterans Administration Hospital, Hines, Illinois; Pauline Kegereis, The Children's Mercy Hospital, Kansas City, Missouri; Mildred Bonnell and administrative interns, University of Washington, Seattle; and the Journal staff.*

## THE AMERICAN JOURNAL OF PHYSIOLOGY

*Vol. 162, July, 1950*

*Influence of dietary factors on hypertension induced by choline deficiency. P. Handler and F. Bernheim.—p. 189.

**Dietary Factors and Hypertension.** The finding has been confirmed that one week of choline deficiency at weaning age results thereafter in systemic hypertension in rats maintained on stock rations. When such rats were transferred to synthetic diets low in either protein or salt, systolic pressures fall to essentially normal levels within three weeks. The blood pressure of rats on low-protein or low-salt rations could be maintained at moderately elevated levels if they were fed unusually large amounts of salt or protein, respectively.

## AMERICAN JOURNAL OF PUBLIC HEALTH

*Vol. 40, June, 1950*

*The Newburg-Kingston caries fluorine study. I. Dental findings after three years of water fluoridation. D. P. Ast, S. B. Finn, and I. McCaffrey.—p. 716

**Teeth and Water Fluoridation.** In Newburg, New York, approximately 3400 children, ages six to twelve, have received sodium fluoride in their drinking water for a period of three years. As a result, the DMF (decayed, missing, or filled) rate for permanent teeth showed a consistent downward trend of 6.5 permanent teeth. A control group of 2800 children in Kingston, New York, was also observed. A major part of the caries occurred in first year molars, and after three years of fluoride experience, Newburg's rate was 48.0 DMF while Kingston's was 58.7. The former group showed a saving of 18 per cent in DMF first molars. The greatest benefits were noted in the younger age groups.

## BRITISH MEDICAL JOURNAL

*No. 4667, June 17, 1950*

*Prolongation of initial starvation period in premature infants. W. Gaisford and S. Shofield.—p. 1404.

**Starvation Period in Premature Infants.** In a group of 231 premature infants the initial feeding was delayed from the customary 24 hr. after birth to 70 hr. or more. While the initial weight loss was greater, the weight gain by the end of the third week was greater than in the control group. Edema of greater or less degree, which is one common occurrence in premature infants, disappeared more quickly when fluid was withheld. Only three of the infants became markedly dehydrated and needed parenteral fluid. This procedure is recommended to decrease the hazards encountered in feeding fluids to the premature infant.

## THE CANADIAN MEDICAL ASSOCIATION JOURNAL

*Vol. 63, July, 1950*

*Malnutrition in Canada. L. B. Pett.—p. 1.

An outline of iron metabolism. L. Brunton.—p 74.

**Signs of Malnutrition in Canada.** Malnutrition cannot be properly assessed alone from one sign, from diet, or from laboratory tests. Even with all these approaches, much information is still needed before a satisfactory system of assessment will be evolved. A dietary history is valuable as a basis for advising the patient on practical improvement, because there is still no substitute for a good diet of ordinary foods. With it, results of physical inspection and laboratory tests can also be confirmed or questioned. The prevalence of certain deficiencies, by age and sex, among 6000 Canadians is recorded, along with the prevalence of single signs sometimes related to the diagnosis. Color plates showing cheilosis, angular stomatitis, and blepharitis are included.

## JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

*Vol. 143, July 1, 1950*

*Nutritional melalgia. S. Vernon.—p. 799.

*Soils and health. L. A. Maynard.—p..807

Degenerative changes in children with diabetes. Editorial.—p. 817.

*Vol. 143, July 8, 1950*

Sensitivity to vitamin $B_{12}$ concentrate. W. C. Young and C. W. Ulrich.—p. 893.

*Vol. 143, July 22, 1950*

Proteins. Editorial.—p. 1071.

*Vol. 143, July 29, 1950*

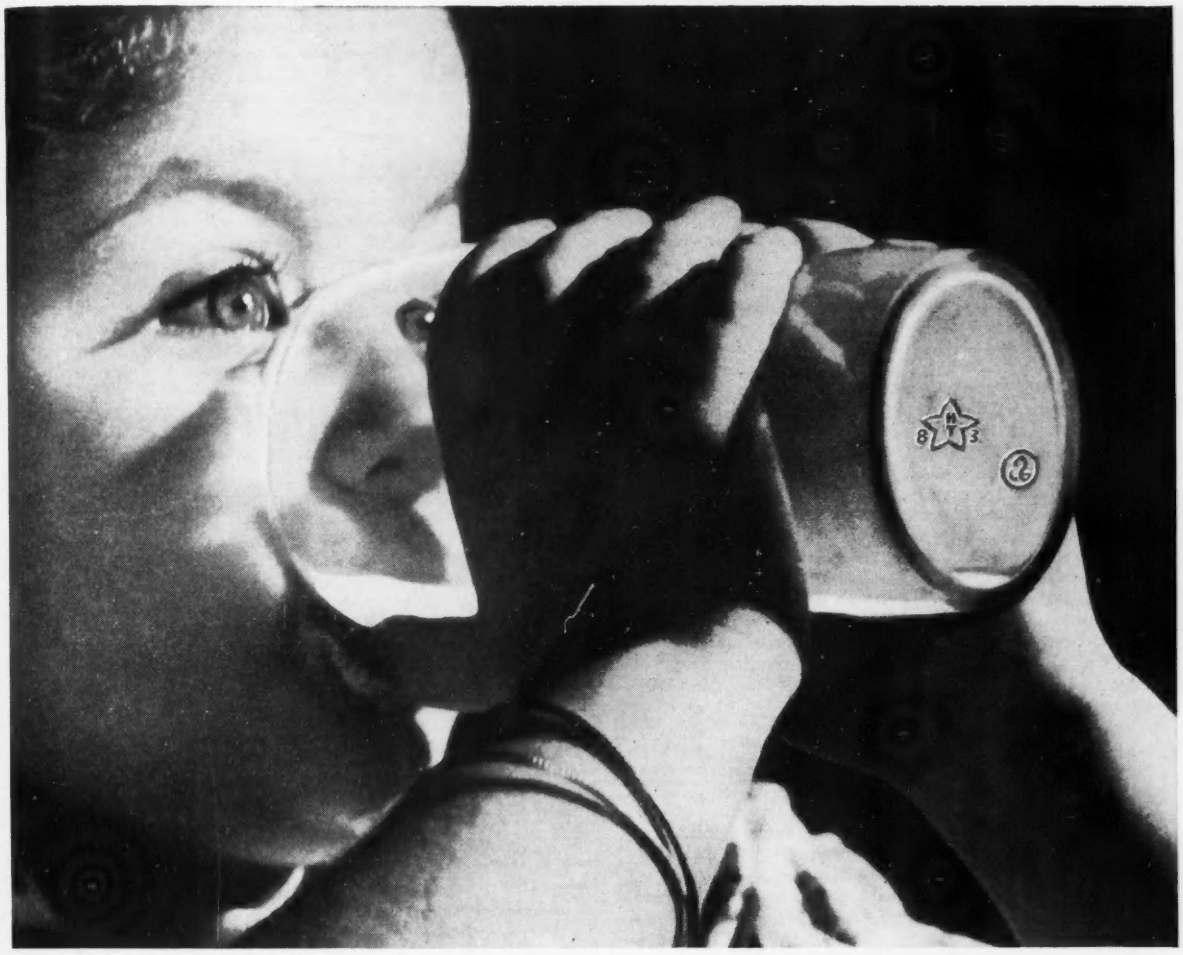
*Sparing action of fat. Editorial.—p. 1160.

*Vol. 143, August 5, 1950*

*Mineral deficiencies. J. B. Youmans.—p. 1252.

**Nutritional Melalgia, A Deficiency Vascular Disease.** During World War II some prisoners complained of burning feet with shooting pains in their legs. Though they did not have muscle wasting or paralysis, these cases often were diagnosed as beriberi. Vitamin $B_1$ therapy did not relieve these symptoms and sometimes pain was aggravated by such treatment. The conclusion is made that the condition was due to lack of some unknown food factor that is present in an adequate, varied diet. Suggested treatment was calcium pantothenate plus pyridoxine and other B-complex factors.

**Soils and Health.** Foods of plant origin vary in mineral content according to the soil from which they come. However, outside of the long-recognized case of iodine, the health implications for human beings from varied mineral content of plant foods remain uncertain. Still, where populations have a low consumption of dairy products, an increase in the calcium content of leafy vegetables would be helpful. Fertilization of soil increases the production of calcium per acre but sometimes lowers its concentration in the crop. Fertilization may increase the content of one mineral and decrease that of another. Fertilization which increases yield does not necessarily increase nutritive value. Nevertheless, it may be needful to increase total crop production by fertilization. The nutritive value of animal products is not influenced significantly by factors traceable to the soil. The vitamin content of plant foods is influenced greatly by varied climatic factors but not significantly by the fertility of the soil. There is a possibility that soil factors may influence the amino acid make-up of plant proteins.



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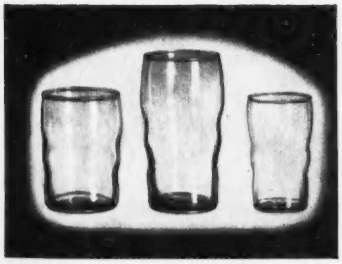

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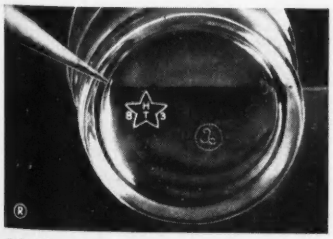

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**Sensitivity to Vitamin $B_{12}$ Concentrate.** A patient who was highly sensitive to extracts of both pork and beef liver also reacted to $B_{12}$ concentrate made from streptomycin but showed no evidence of sensitivity to crystalline vitamin $B_{12}$.

**Sparing Action of Fat.** Fats containing linoleic or linolenic acids appear to have metabolic effects on the organism over and above their inherent caloric value. For laboratory rats, higher efficiency in the use of food and particularly the conservation of amino acids was promoted by the inclusion of 8 per cent corn oil or lard in an otherwise fat-low ration. Phenylalanine, valine, methionine, and lysine loss in the feces was diminished. Urinary excretion of valine and methionine was less. In animals studied, the favorable effect of the lipid was not only on absorption but also on metabolism of amino acids.

**Mineral Deficiencies.** *Iron* deficiency, the most common nutritional deficiency, is rarely the result of inadequate iron intake. It is the result of loss of iron (a) by bleeding, (b) in the female by transfer of iron to the fetus, and (c) in the child by failure to receive an adequate supply of iron at birth. Iron deficiency anemia is usually the result of some other disease or occurrence and requires specific treatment with pharmaceutical iron and cannot be relieved simply by diet. *Calcium* deficiency in adults, osteomalacia, is largely confined to pregnant women or those who have had many pregnancies. Other calcium deficiencies in adults occur in sprue due to losses in the stool of calcium bound to the unabsorbed fat, and in patients with hypoparathyroidism. Calcium deficiency in children is so interrelated with vitamin D deficiency that to some extent both are considered a single disease; it is unlikely that vitamin D shortage often occurs in adults. Factors affecting calcium absorption are: (a) proportions of calcium and phosphorus in the diet, (b) availability of dietary calcium, (c) acid-base reaction of the diet and the presence or absence of hydrochloric acid in the stomach, (d) factors other than vitamin D, and (e) factors affecting the general metabolism, such as pregnancy, lactation, and disturbances in hormone regulation. Senile calcium demineralization may be the result of chronic illness and endocrine disorders rather than an actual calcium deficiency. *Iodine* lack may result in goiter and/or hypofunction of the thyroid gland. Both or either of these conditions may be present when iodine is lacking, but when hypothyroidism is due to iodine deficiency, it is usually accompanied by a goiter. Goiter can exist without any interference with body function while hypothyroidism affects growth and activity of all tissues. Mass prevention of iodine deficiency, through the use of iodized salt, is easy and highly successful. General hygiene and diet should also be considered in the prevention of goiter. There is an advantage in using fresh vegetables but the goitrogenic action of some, such as cabbage and related vegetables, must be considered.

## THE JOURNAL OF CLINICAL INVESTIGATION

*Vol. 29, May, 1950*

*The metabolism of glucose and electrolytes in diabetic acidosis. D. W. Seldin and R. Tarail.—p. 552.

Effect of choline and methionine, testosterone propionate, and dietary protein on nitrogen balance in patients with liver disease. G. J. Ganuzda, R. D. Eckhardt, and C. S. Davidson.—p. 566.

*Vol. 29, June, 1950*

*Studies on diabetes mellitus: the relation of stressful life situations to the concentration of ketone bodies in the blood of diabetic and non-diabetic humans. L. E. Hinkle, G. B. Conger, and S. Wolf.—p. 754.

**Glucose and Electrolytes in Diabetic Acidosis.** Seventeen cases of diabetic acidosis, studied during the early stages of treatment, received moderate or massive injections of glucose. Utilization of carbohydrate occurred within the first 2 to 4 hr. of treatment, since the injected glucose could not be completely recovered in the urine or extracellular fluid. Glycosuria eliminated sodium chloride as well as water in large amounts and was probably the major cause of salt depletion and dehydration. Evidence is presented suggesting that glucose is confined to the extracellular fluid. Hyperglycemia, therefore, draws water out of cells, producing cellular dehydration and diluting the serum sodium and chloride. This is probably a major cause of the low serum sodium concentrations, and masks the magnitude of the total water deficit. Because of the deleterious consequences of hypertonicity and cellular dehydration, the importance of glucose solution as a vehicle for the administration of water without salt is stressed. Glycosuria resulting from injections of exogenous glucose does not sweep potassium into the urine. The mechanism responsible for the initial elevation and subsequent depression of the serum potassium is discussed.

**Blood Ketone Levels in Diabetic Patients During Stress.** Stimuli arising out of the life experience which are either consciously or unconsciously interpreted by the individual as threats to his security may produce in both diabetic and non-diabetic humans a rise in the ketone bodies in the venous blood, apparently because of increased production in the liver, and fluctuations in the blood sugar level. The magnitude of the observed ketone elevations was much greater in diabetic than in non-diabetic persons. It seems probable that such changes with accompanying changes in fluid balance may, if sustained, lead to clinical acidosis, without the intervention of other factors such as intercurrent illness, changes in physical activity, or alteration of insulin or food intake. Blood ketone levels which were elevated during stress subsided when relative emotional security was achieved, without extra insulin or other therapeutic manipulation. The mechanism involved in these changes is not yet established, but the evidence adduced in this study suggests that it involves a stimulation of the pituitary-adrenal mechanism.

## THE JOURNAL OF NUTRITION

*Vol. 41, June, 1950*

*Thiamine and riboflavin intakes and excretions during pregnancy. H. Oldham, B. B. Sheft, and T. Porter.—p. 231.

*Correlation of urinary excretion of riboflavin with dietary intake and symptoms of ariboflavinosis. M. K. Horwitt, C. C. Harvey, O. W. Hills, and E. Liebert.—p. 247.

*Vol. 41, July, 1950*

*The effect of phytate and other food factors on iron absorption. L. M. Sharpe, W. C. Peacock, R. Cooke, and R. S. Harris.—p. 433.

**Thiamine and Riboflavin in Pregnancy.** This investigation of the diets of fifteen women was initiated to study the intake of thiamine and riboflavin of primigravidae on self-selected diets. The corresponding rates of urinary excretion and the test dose returns of these vitamins were studied. With the exception of calories, the intakes of five subjects approximated the Recommended Dietary Allowances. The intakes of all nutrients by the remainder of the group were definitely below the recommended allowances with four of the subjects having extremely poor diets. The course of the pregnancies, the condition of the infants at birth, and the postnatal development of the infants did not appear to be correlated with the quality of the mothers' prenatal diets. When compared with data on non-pregnant women on similar intakes, neither the returns of thiamine and riboflavin test doses nor the daily excretions of these vitamins indicated an increased need during a normal pregnancy.

**Riboflavin Requirement.** Studies of urinary excretion of riboflavin in the human being suggest that an adult male subsisting on 2200 calories needs between 1.1 and 1.6 mg. riboflavin daily. Subjects exposed to little or no trauma or irritation and receiving 1.6 mg. riboflavin per day excreted four times as much as those on a 1.1-mg. intake. Healing of

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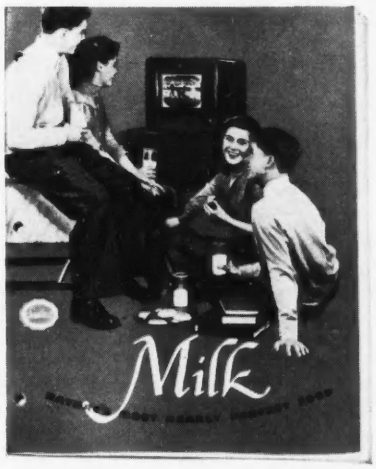


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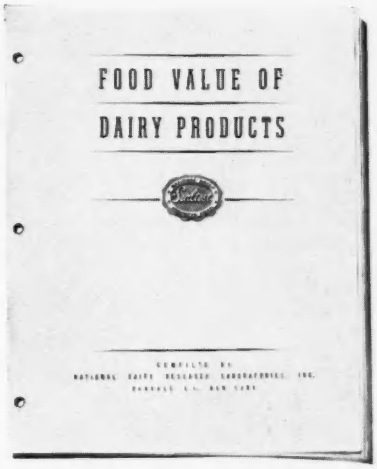


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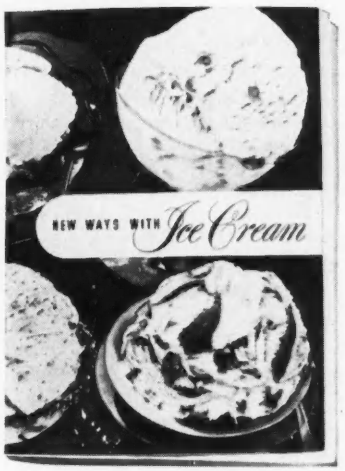


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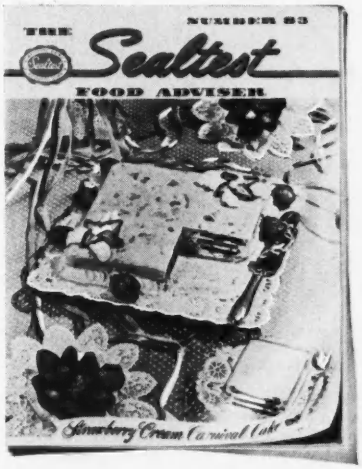


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the skin lesions characteristic of ariboflavinosis was retarded when the 24-hr. urinary excretion of riboflavin was less than 50 mcg. Such a level may be reached in less than four months on a diet containing 0.55 mg. riboflavin per day. A subject depleted in riboflavin can satisfactorily assimilate at least 6 mg. riboflavin per day. A period of approximately fifteen days is required to saturate riboflavin-depleted subjects when a daily supplement of 6 mg. is administered.

**Phytate and Radioactive Iron Absorption.** A theory has been advanced that phytates interfere with iron absorption by reacting with the iron as it passes through the intestinal tract, and that the insoluble iron phytate which is formed is unabsorbable. Rolled oats, in common with other cereals, contain significant amounts of phytates. In this study, the effect of rolled oats and sodium phytate on the absorption of radioactive iron was studied on seven adolescent boys. Milk reduced the absorption of iron by one-third. This was not due to the action of phytate, for the milk contained none. Rolled oats and milk reduced the absorption of iron by two-thirds. There was no correlation between the phytate content of rolled oats and the reduction in iron absorption. Sodium phytate reduced the absorption of iron by fifteen-fold, indicating that added soluble phytates can interfere with iron absorption. The absorption of iron from the breakfast was one-fifth that from the water meal. Medicinal iron should be more effective if administered between meals.

## PUBLIC HEALTH REPORTS

*Vol. 65, June 16, 1950*

**Salmonella* in hen eggs. M. J. Carter, M. P. Powell, and I. H. Borts.—p. 788.

***Salmonella* in Hen Eggs.** Although hen eggs, as a source of *Salmonella* infection, have been incriminated in only a few instances, the possibility of the transmission of this organism by serving uncooked eggs should be recognized. One hundred eighty-six samples, representing 247 doz., or 2964 eggs, taken from 56 cases were examined. Positive cultures were obtained from 6 samples (or 3.2 per cent of the samples). Each positive sample came from a mixture of 1 doz. eggs. Under the procedure, the infection could come from the contents or from the shells of the eggs. The finding in this study emphasizes that the potential hazard of infection from uncooked eggs is greater than heretofore recognized.

## SOUTHERN MEDICAL JOURNAL

*Vol. 43, July, 1950*

*Constipation: its relationship to anorectal disease and to diet and fluid intake. G. H. Thiele.—p. 621.

*Dietary lesions of the pancreas. Editorial.—p. 652.

**Diet and Fluid Intake in Constipation.** The incidence of constipation in patients seen in a proctologic practice was 55 per cent. Constipation usually occurs in normally stable persons whose dietary bulk is far less than it should be, and whose fluid intake is inadequate as a wetting agent for the bowel residue. Histories of constipated individuals revealed that the daily fluid intake averaged 2½ pt. An equal number of nonconstipated individuals had an average daily fluid intake of 3½ pt. In treating constipation, the diet should consist of fresh or stewed fruits for breakfast instead of fruit juices. Lunch should include a fresh fruit or a bulky salad, or if the latter is not available some bulky vegetables. Dinner should include a salad, generous servings of two such vegetables as cabbage, Brussels sprouts, sauerkraut, green beans, peas, asparagus, corn, spinach, okra, or baked squash. The use of a pressure cooker will enhance both the taste and the digestibility of many of these vegetables. Raw carrots, celery, lettuce, water cress, and tomatoes should be used freely. Fresh fruits, as grapes, apples, pears, peaches, apricots, may be eaten during the latter part of the evening before retiring. Patients are advised to drink a full 8-oz. glass of water each waking hour. Evidence is offered that constipation in itself is not the most common exciting cause of anorectal disease.

**Dietary Lesions of the Pancreas.** The years since World War II have furnished case histories of extreme nutritional deficiencies. Hungarian physicians describe lesions of the pancreas which developed in infants maintained for as little as a week on a diet without animal protein. Recognized signs of advanced protein deficiency are fatty liver and edema. Infants on the protein-deficient diet, however, early showed cessation of the external secretion of the pancreas. The pancreatic islets even at necropsy appeared normal. Pancreatic failure in infants appeared in seven to fourteen days after the protein-deficient feeding began; the younger the infant, the more rapidly the symptoms developed. Necropsies showed lesions of the acini with fibrosis and cirrhosis in the late stages. The Hungarian group repeated the clinical studies using similar rations for young rats. Pancreatic failure of the type described was acute. It is to be expected that adult human beings on a continued low-protein ration would likewise develop a deficiency of pancreatic excretion and diminished production of pancreatic enzymes, with abdominal symptoms which over a period of years might be interpreted by the patient merely as "indigestion." The possibility of acute pancreatic disturbance in persons who have been maintained on a rice diet or any limited therapeutic regimen should not be forgotten.

## AMERICAN RESTAURANT MAGAZINE

*Vol. 34, July, 1950*

Keep hot things on summer luncheon menus, too. L. D. Freeman.—p. 35.

*Turnover and quantity buying. H. J. Ashe.—p. 44.

Your customers can't eat fire.—p. 88.

**Quantity Buying.** To the argument of quantity buying versus low inventories is added this article favoring the former. Convincing percentages of savings over a period of time are presented in favor of carrying more than a limited inventory. Annual earnings on quantity discount rates are shown in chart form.

## COLLEGE AND UNIVERSITY BUSINESS

*Vol. 9, July, 1950*

*Every plate a bouquet makes for successful menus.—p. 47.

**Menus.** Carson Gulley, Senior Chef at the University of Wisconsin, believes the bouquet in food is discovered by seeing, smelling, and tasting. He gives his special recipes for baked beans and creamed vegetable soup and many suggestions for cookery and menu planning, including the results of his experiments with varieties of apples.

## FOOD INDUSTRIES

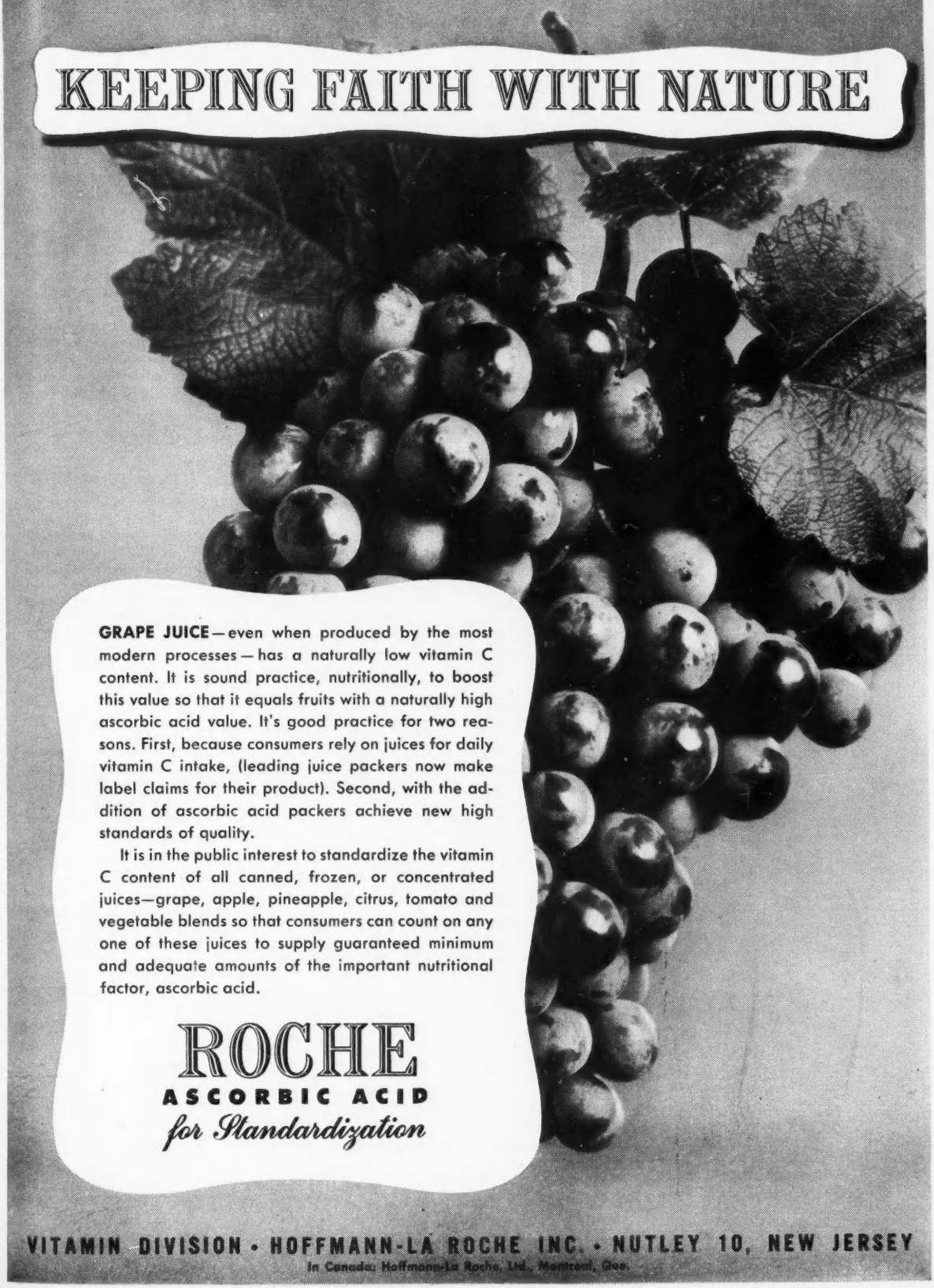
*Vol. 22, July, 1950*

*How Cheddar cheese is made.—p. 102.

**Cheese Production.** Pictured and described with flow-sheet and photos is the production of Cheddar and club cheese at a new $1,500,000 plant in Oregon. Other products are also made in the plant—pasteurized and bottled Grade A milk and cream, butter, ice cream, buttermilk, cottage cheese, and chocolate milk. How these operations are integrated with cheese making is also shown.

One of a Series Dedicated to the Nutritional Advances of the Food Industries

# KEEPING FAITH WITH NATURE



**GRAPE JUICE**—even when produced by the most modern processes—has a naturally low vitamin C content. It is sound practice, nutritionally, to boost this value so that it equals fruits with a naturally high ascorbic acid value. It's good practice for two reasons. First, because consumers rely on juices for daily vitamin C intake, (leading juice packers now make label claims for their product). Second, with the addition of ascorbic acid packers achieve new high standards of quality.

It is in the public interest to standardize the vitamin C content of all canned, frozen, or concentrated juices—grape, apple, pineapple, citrus, tomato and vegetable blends so that consumers can count on any one of these juices to supply guaranteed minimum and adequate amounts of the important nutritional factor, ascorbic acid.

ROCHE

ASCORBIC ACID

*for Standardization*

VITAMIN DIVISION • HOFFMANN-LA ROCHE INC. • NUTLEY 10, NEW JERSEY

In Canada: Hoffmann-La Roche, Ltd., Montreal, Que.

## INSTITUTIONS MAGAZINE

*Vol. 27, July, 1950*

*Imaginative use of garnitures gives sparkle to soups.—p. 39.

**Garnish Your Soups.** Soups are more pleasing and tempting when garnished with a food that blends in flavor with the soup and adds a gay touch. Dry cereals, browned in butter or margarine before adding to the soup, are excellent in cream of tomato, cream of asparagus, ox tail, bean with bacon, or cream of chicken soups. A lemon slice adds perfection to black bean soup, clam chowder, hot or jellied consommé or bouillon. Parsley clusters or minced parsley is good on all soups. Chopped chives drift nicely and taste good in vegetable, chicken noodle, beef noodle, vegetable beef, chicken with rice, or tomato soups. Step up the flavor of pepper pot, cream of chicken, green pea, and tomato soups, clam chowder, or Scotch broth with a garnish of crisp bacon dices. Press hard cooked eggs through a sieve to use as a garnish for beef, black bean, or ox tail soups. Thin frankfurter slices, browned in butter or bacon fat, are good in green pea and bean with bacon soups. Croutons may be strewn in any soup. Oyster crackers are especially good with tomato soup or clam chowder. Whipped cream can be used quite nicely as a garnish for ox tail, tomato, or black bean soups. Consommé or bouillon can be garnished with vermicelli or rice.

## QUICK FROZEN FOODS

*Vol. 12, July, 1950*

*High frequency heating for defrosting and blanching frozen foods. E. W. Eickelberg.—p. 48.

*Thawing and cooking methods for meat.—p. 69.

**Electronic Heating for Frozen Foods.** Higher quality packs can be obtained by the use of high frequency waves which are rapid and minimize nutritional losses that occur when food is processed in steam or water. The main applications are the rapid thawing of frozen foods by dielectric heating and inactivation of enzymes by high frequency electronic heating. This rapid defrosting saves time, flavor, and nutrients. Enzyme inactivation prevents off flavors and preserves nutrients. Little actual application of higher frequency heating has been accomplished. The greatest immediate use is the defrosting of small packages of frozen foods.

**Frozen Meat Palatability.** Pork, beef, and lamb were tested and the palatability was judged by a panel of experts. Bacterial plate counts were made before freezing, before and after thawing, and after cooking. Pan broiled, oven browned, and pre-browned dielectrically cooked patties were superior to the unbrowned dielectrically cooked patties in color, crust quality, and flavor. Bacterial counts were low in all cooking methods. Retention of several vitamins were determined. Dielectric methods decrease the cooking time.

## RESTAURANT MANAGEMENT

*Vol. 47, July, 1950*

*What your customers think of you.—p. 31.

*Cutting food and labor costs.—p. 36.

**Customer Attitudes.** In a recent survey some interesting facts regarding customer attitudes were revealed. Customers feel that restaurant personnel are lacking in courtesy and that most restaurants fall short in pleasant atmosphere and cleanliness. Chief complaints against food were smallness of portions and little menu variety. Women complain less often than men. Results of this survey were more encouraging that those gained seven years ago in a similar survey.

**Money Saving Ideas.** Some timely advice is given on how to cut food and labor costs. These ideas have been put to practical application and proved successful in a chain of Pennsylvania restaurants. Stress is placed on the importance of keeping close daily check on purchases, store room and refrigerator inventory, sales analysis, portion control, and careful planning to avoid waste and leftovers. Labor costs are cut by installing time-saving devices and good arrangement of equipment.

## THE SCIENTIFIC MONTHLY

*Vol. 71, July, 1950*

*Sheet materials for wrapping frozen foods. J. D. Winter.—p. 61.

**Sheet Materials for Wrapping Frozen Foods.** A wrapping material for frozen foods should have the following qualities: low rates of transmission for both oxygen- and moisture-vapor at temperatures of 0° F. or lower; enough pliability to make a close, tight wrap; greaseproofness; odorlessness, especially when damp; and high wet strength so that meat juices or other liquids will not cause it to soften and break. It must be strong to resist tearing and puncturing. Wrapping materials are available in four distinct types: films, laminated or plastic-coated sheets, foils, and waxed papers. These materials are described. The cost of the various sheet materials is now so competitive that practically all of them fall within a rather narrow range in terms of cost per pound of meat wrapped. Under average locker plant operation this cost is approximately 50 to 70 cents per 100 lb. meat, hook weight. The cost of wrapping and freezing meat at home is higher than is generally recognized. Wrapping materials purchased in retail rolls will cost about $1.40 to $1.85 per 100 lb. meat wrapped. When the freezing cost is added, the total cost is not much lower than the price charged by many locker plants for cutting, grinding, wrapping, and freezing the meat and marking the packages.

### *Nuts May Help to Make Better Cheese*

Proteolytic enzymes from filbert nuts can be used to produce American, or Cheddar type cheese of superior flavor, according to a report from Oregon State College given at the 118th national meeting of the American Chemical Society in Chicago in September.

The study was conducted in an effort to develop new uses for Oregon's surplus nuts. Cheese was studied because of the present trend toward manufacture of cheese from pasteurized milk—a procedure which produces milk cheese with less flavor and slightly different characteristics from those found in the cheese made from raw milk.

Samples of Cheddar cheese were taken from a commercial cheese vat after milling, and salt was added. A measured volume of the filbert extract was added to each experimental sample and a similar volume of water to the control samples. The regular processing and storage procedures were followed. At the end of four months, according to the report, expert cheese tasters pronounced the cheese made with the filbert extract to have much better flavor than all of the other samples, including the controls. No filbert nut flavor was transferred to the cheese. It was better aged also, and in addition to the improvement in flavor, the ripening time was substantially shortened.

# completely fulfills every carbohydrate requirement

**KARO Syrup is a perfect carbohydrate...a mixture of dextrose, maltose and dextrins**

**FOR INFANT FEEDING** physicians have prescribed KARO® Syrup for 30 years, recognizing it as an ideal milk modifier. For all types of formulas . . . for all infants; well or sick.

**FOR HIGH CARBOHYDRATE FEEDING** KARO, being a mixture of dextrose, maltose and dextrins, can be given in larger amounts than any single sugar.

**FOR THE ELDERLY** carbohydrates provide most of the calories. KARO Syrup is ideal for the delicate digestive tract. KARO is easily digested, well tolerated . . . resistant to intestinal fermentation. It is completely absorbed and utilized.

*Medical Division*

**CORN PRODUCTS REFINING COMPANY**

**17 BATTERY PLACE • NEW YORK 4, N. Y.**

*P.S. KARO Syrup is readily available in case lots, from any food wholesaler.*

# News Notes

**Health Care Needs of School-Age Children.** From August 5 to 12, an expert committee on school health services met in Geneva, Switzerland, under the auspices of the World Health Organization. As part of its work, the committee defined for the first time on a world-wide basis the basic principles for provision of health care for school-age children. It emphasized the need for school services to be organized as "team projects" involving parents, the community, professional groups, social agencies, and others interested in child welfare. In addition, school health services should be a direct continuation of pre-school services. The following were listed as the minimum comprehensive, continuous functions to be performed by school health services:

(a) Medical supervision and dental hygiene.

(b) Communicable disease control.

(c) Nutrition. The committee believed that schools, particularly in areas of low economic status, have an important function in actual provision of meals and that nutrition education should go along with meals.

(d) Mental health. Since schools provide an excellent opportunity for detection of psychological problems in children at an early stage, the committee stressed the value of mental health programs in schools and emphasized the role of the teacher.

(e) Health education. The committee recommended establishment, wherever possible, of health education programs in cooperation with parents and community groups.

The committee stressed the belief that schools in all areas, particularly in under-developed regions, should serve as demonstration centers for public health measures. Sanitary school buildings not only should promote the child's health, but also serve as an educational example for the community.

**National Research Council News.** A technical Committee on Food Protection has been appointed by the National Research Council to study data on chemicals to be used in foods or designed for uses that will affect food products. The organization of such a committee was first formally prosed at a meeting of industrial, governmental, and academic scientists called by the Food and Nutrition Board on December 29, 1949. It was approved by the National Academy of Sciences on June 12, 1950. In addition to the committee, there will be an advisory panel to be made up of representatives of contributing organizations, federal control and research agencies, scientific societies, and trade associations. It is felt that the major problem of the committee will be to establish "with accuracy and objectivity" the technical facts of chemical use in foods and on agricultural products. These facts then may be used to guide industry, agriculture, and government and to reconcile differences of opinion among divergent interests.

Dr. H. E. Longenecker, Dean, University of Pittsburgh Graduate School, is chairman of the committee. Other members are: William J. Darby, George C. Decker, Donald E. H. Frear, C. E. F. Guterman, L. A. Maynard, J. L. St. John, and R. B. Smith.

**Study on Human Milk.** A publication titled *Human Milk—Wartime Studies of Certain Vitamins and Other Constituents* by S. K. Kon and E. H. Mawson has been released as Special Report Series No. 260 of the Medical Research Council of England. It is a report which describes an investigation in which methods developed for the study of cow's milk were applied on a large scale to human milk. The survey itself extended over almost four years from 1941 to 1945 and involved three dietary surveys and the collection and analysis of single specimens of milk from more than two thousand nursing mothers. Specific information is also given on precautions taken to prevent sampling errors. Differences between cow's milk and human milk are pointed out, and the authors emphasize the danger of applying conclusions drawn from studies of cow's milk to human milk. Copies may be obtained in this country from the British Information Services, 30 Rockefeller Plaza, New York 20, at a cost of $1.

**Bibliography on Food Preparation.** A mimeographed reference aid, titled *Food Preparation and Related Subjects: A Selected Annotated List of Books* was issued in July by the National Council on Hotel and Restaurant Education. The lists of titles have been divided into ten major categories, including: large and small quantity cookery; employees, food handling and sanitation; food service, carving, and table setting; kitchen planning; management; nutrition and dietetics; science textbooks, and selection and purchase of foods. The publications were selected on the basis of their usefulness to teachers and students in cookery classes on various levels—high school, institute, junior college, and university, but the compilers feel that they would also be helpful to managers and supervisors actively working in the field of food production. This bibliography can be obtained from the Council, Benjamin Franklin Station, Box 7727, Washington, D.C., for $1 per copy.

**Report on Supplementing Grains with Proteins.** The Agricultural Experiment Station, University of Arkansas College of Agriculture, has released its Bulletin No. 493, titled *Nutritional Improvement of Cereal Grains with Small Amounts of Foods of High Protein Content* by Barnett Sure. In it are reported experiments designed to learn if diets composed largely of cereal grains and cereal flours (low-cost diets) could be enriched by additions of small amounts of high-protein-containing foods, such as dry debittered brewers' yeast, dry cultured yeasts, dry nonfat milk solids, low-fat soybean flour, and peanut meal. Experiments were carried out on white rats, and the work was then supplemented by acceptability tests with human subjects.

**New Government Publications.** The Information Branch, Production and Marketing Administration, U.S.D.A., has available for distribution a new two-color chart, 30 by 45 in., called "U.S. Consumer Grades for Potatoes." Actual sizes of potatoes in the four grades are pictured.

A new Army Technical Manual, TM 8-501, is titled *Nutrition*. It includes discussions of nutritional requirements in the Army and methods of evaluating the adequacy of a ration, as well as tables of food classification and nutritive composition of various food groups. It is available from the Superintendent of Documents, Washington 25, D.C., for 20 cents per copy.

**International Dairy Exposition.** October 7 to 14 are the dates for the International Dairy Exposition to be held in Indianapolis. Called the "World's Fair of the Dairy Industry," this exposition is the largest of its kind, and includes five major shows. The senior show is expected to draw the finest dairy cattle in the country into a competition for over $50,000 in prizes and awards. There will also be a show for rural youth, drawing from 4-H Clubs and Future Farmers of America. Other shows are planned to interest consumers. The "Festival of Dairy and Related Foods" which will dramatize the magnitude of the dairy industry and help to focus attention on the nutritive and budgetary advantages of dairy product. A Dairy Farm Equipment and Supply Show will be included as one of the major features of the exposition, as well as a truck show in which latest model trucks will be exhibited. The influence of dietitians was felt in the planning of the Exposition, for our A.D.A. President, Elizabeth Perry, is serving as a member of its National Advisory Committee. In addition, the Indiana Dietetic Association is presenting an exhibit.

**A.H.A. Institute on Dietetics.** The American Hospital Association has announced that an institute on dietetics for hospital dietitians will be held in Chicago at the Stevens Hotel, December 4 to 8. Further details of this institute

Why don't all margarines melt in your mouth?
... why don't they have that wonderful Nucoa flavor? Because *Nucoa* processes oils to give them a melting point *below body temperature*. Margarines made of higher melting point oil have less appealing texture—don't melt cleanly in the mouth—*can't* match Nucoa's fresh rich flavor!

# NUCOA—

## Always one step ahead to bring you a better spread!

★ IT'S FRESH
★ IT'S DELICIOUS
★ IT'S RICH
★ IT'S NUTRITIOUS
ONE POUND NET WEIGHT
NUCOA
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OLEOMARGARINE
In those states where the ban on yellow margarine has not yet been lifted, get Nucoa in the handy Measure-Pak.
"NUCOA" REG. U. S. PAT. OFF.

Nucoa margarine has led the field for over 30 years with important "firsts" like these: the *first* to use all vegetable oils . . . the *first* to be enriched with vitamin A . . . the *first* to raise vitamin A content to 15,000 units per pound . . . the *first, and only,* margarine in the convenient Measure-Pak . . . the *first, and only,* yellow margarine to be colored with carotene—nature's own vitamin A-rich coloring.

And Nucoa has other advantages, too. It's so delicious, so smooth and easy to spread . . . and *always* so fresh. That's because it's made on order only . . . never stored. First-rate cooking, first-rate nutrition depend upon first-rate foods. That's why more and more home economists and nutritionists insist upon Nucoa.

## No Wonder NUCOA is America's Largest-Selling Margarine

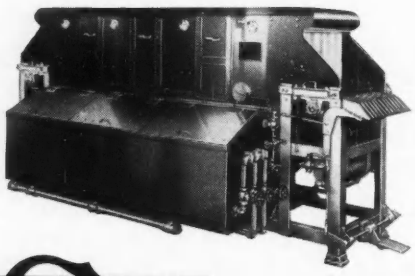
# COLT AUTOSAN is your Best Buy in dishwashing equipment!

**HERE'S PROOF!** Two large metropolitan hotels installed dishwashing equipment some twenty years ago. Hotel "A" installed Colt Autosan which is still giving excellent service today.

Hotel "B" invested in competitive equipment which in time was replaced by still another competitive machine. This second installation was recently replaced by Colt Autosan Dishwashers which now provide the trouble-free service enjoyed by Hotel "A" from the beginning.

It has cost Hotel "B" nearly three times the amount invested by Hotel "A" to learn that Colt Autosans are the best buy in dishwashers because they are better designed and better built.

This is one of many case studies* proving that Colt Autosan's built-in durability saves time and money in the long run. And Colt Autosan now offers this quality and durability in a new line of mixers for every size kitchen. Ask your dealer or write for further information. Colt's Manufacturing Company, Hartford 15, Connecticut.

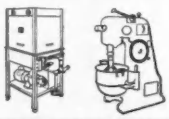


**C-3** (Illustrated)
6500 dishes per hour

**C-22**
6000 dishes per hour

*For details write on your business letterhead.

COLT AUTOSAN



DISHWASHING, SANITIZING,
DRYING and MIXING MACHINES


may be obtained by writing to the American Hospital Association, 18 East Division Street, Chicago 10.

**Dietetic Interns Graduate.** Four dietetic interns received certificates of graduation from *Shadyside Hospital*, Pittsburgh, at a dinner in their honor on August 24. William E. Barron, Administrator of the hospital, presented the certificates. Irene L. Willson, Director of the Dietary Department, presented membership pins for A.D.A. to the following new dietitians: Doris Busche, Ohio State University; Katherine Caprio, Drexel Institute; Mary Weikel, Carnegie Institute of Technology; and Ruth Schultz, Kansas State College.

On August 31, eight interns graduated from the course for dietetic interns at *Good Samaritan Hospital*, Portland, Oregon. The graduates are: Jacquelyn Douglas, Seattle; Jeanne Grubaugh, Park City, Montana; Eunice Jenny, Portland, Oregon; Nadine Kirby, Larned, Kansas; Margaret Orth, Cathlamet, Washington; Ellen Park, Boring, Oregon; Orma Podratz, Grand Forks, North Dakota; and Winne Wayne, Fargo, North Dakota.

**New Editor Named for Food Publications.** Dr. Z. I. Kertesz, Division of Food Chemistry and Technology, New York State Agricultural Experiment Station, Geneva, was recently named editor of *Food Technology* and *Food Research*, publications of the Institute of Food Technologists. Dr. Kertesz, who was with the University of Budapest prior to 1929, is known for his work in plant biochemistry and enzyme chemistry.

**WHO News.** An announcement has been made by the World Health Organization that in August Poland resigned its membership in this organization.

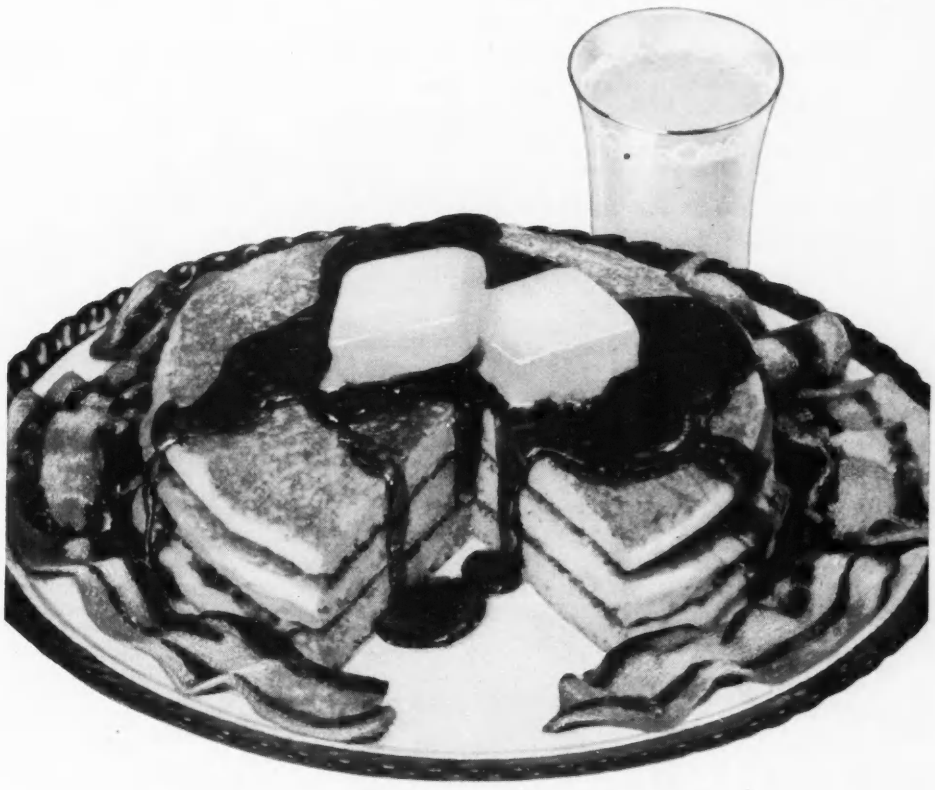
**Plentiful Foods.** The Production and Marketing Administration, U.S.D.A., has announced that the following foods are expected to be plentiful during October:

*Fruits and vegetables*
Cabbage
Cranberries, processed
Onions
Potatoes, Irish
Potatoes, sweet

*Protein foods*
Beans, dry
Cheese
Chickens—broilers, fryers, and hens
Eggs
Peanut butter
Turkeys

*Other foods*
Butter
Honey

**Chronic Disease Research Institute.** In Buffalo, New York, a Chronic Disease Research Institute is being established under the joint auspices of the U.S. Public Health Service, the New York State Department of Health,



# *A Real American Breakfast*

That a nutritious breakfast providing generous amounts of high quality protein prevents late morning hypoglycemia has been amply demonstrated. As shown by Thorn and co-workers,[1] and later confirmed by Orent-Keiles,[2] ". . . breakfast high in protein and low in fat and carbohydrate was followed by an improved sense of well-being and no symptoms of hypoglycemia."

Meat for breakfast—ham, sausage, bacon, breakfast steaks—is an appetizing means of increasing the protein content of the morning meal. Its biologically complete protein contains all essential amino acids, and serves well in complementing less complete proteins from other sources. Furthermore, muscle meat is an outstanding source of B complex vitamins and of iron.

The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

(1) Thorn, G.W.; Quinby, J.T., and Marshall, C., Jr., Ann. Int. Med. 18:913 (June) 1943.
(2) Orent-Keiles, E., and Hallman, L. F., Circular No. 827, United States Department of Agriculture, Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, Dec., 1949.

**American Meat Institute**
**Main Office, Chicago... Members Throughout the United States**

and the University of Buffalo. Plans for the new institute include a fifty-bed, in-patient service for research, as well as an out-patient service, which will include a unit for physical rehabilitation, a multiple screening unit equipped with a mobile truck, and a rehabilitation center for chronic alcoholics.

**U.S.D.A. Reports on Urban Vegetable Consumption.** "Vegetable Selections of City Families," has been published by the Bureau of Human Nutrition and Home Economics, U.S.D.A., as Commodity Summary No. 10. It is a part of the series reporting the Bureau's extensive survey of city-family food habits.

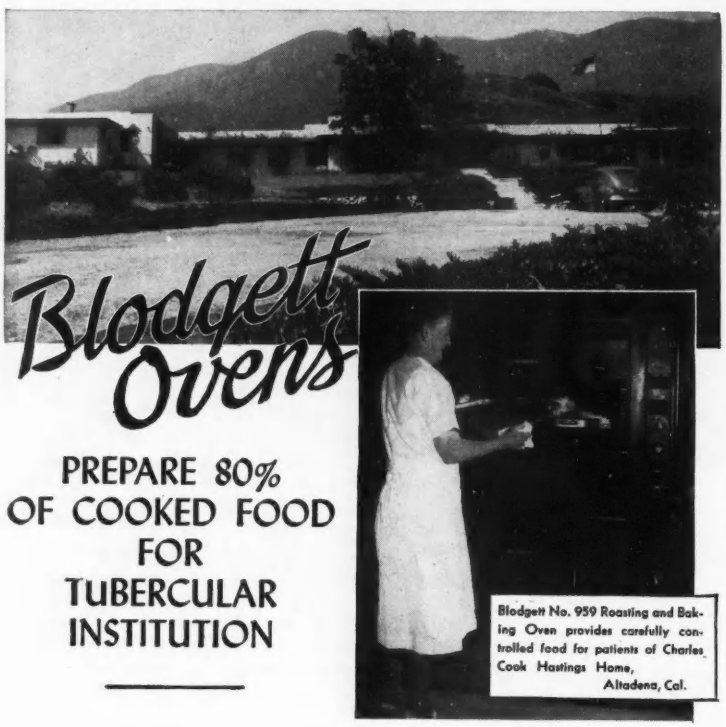
The analysis shows that the average city family consumes 4¼ lb. vegetables per person a week (not including potatoes and sweet potatoes) and spends 9 cents of each food dollar for fresh, canned, or frozen vegetables. Lettuce, used by three-fourths of the households at least once in the survey week, was the most popular spring-time vegetable. Mature onions, consumed by two-thirds of the families, were second in popularity. Carrots, tomatoes, and celery were eaten by half of the families, and cabbage by one-third. Peas, corn, and tomatoes were most popular of the canned vegetables. The higher the income the greater the use of lettuce, salad greens, asparagus, celery, and carrots. Low-income families used more cooking greens, cabbage, and snap beans.

When fruits, potatoes, and sweet potatoes were added to the other vegetables, the total consumption amounted to 20 per cent of the food budget. The group in the lowest economic third has increased vegetable consumption by 15 per cent since 1942, while higher income families, already consuming more vegetables than lower income families, remained at the same level.

**Fish Recipes Tested in New Kitchen.** The Fish and Wildlife Service has a new institutional kitchen to test and develop quantity fish recipes for school lunchrooms. Eighteen recipes have already been developed giving the amount of protein-rich food and cost per serving, with four suggested menus that meet Type A school lunch requirements. Home economists of the Service conducted 155 demonstrations on fish in school lunches during 1949. The recipe cards, demonstrations, and a 16 mm. color film, *Food for Thought*, showing the use of fish in school lunch menus, are available from the Branch of Commercial Fisheries, Fish and Wildlife Service, U.S. Department of the Interior, Washington 25.

**New Bread Standards.** A new tentative identity standard for breads, buns, and rolls has been announced by Oscar R. Ewing, Federal Security Administrator. Certain emulsifiers and "dough conditioners" are forbidden under the new standards, but some oxidizing agents and "harmless ammonium and calcium salts" are permitted. Included in the forbidden emulsifiers are: sorbitan esters of fatty acids, polyoxyethylene sorbitan esters of fatty acids, and polyoxyethylene esters of fatty acids. Mono- and diglycerides of fat-forming fatty acids, previously recognized in the 1943 tentative order, are permitted but are limited to not more than 25 per cent of shortening weight. Also banned are ammonium persulphate and potassium persulphate for use as "dough conditioners," but the following are allowed as oxidizing agents: potassium bromate, potassium iodate, and calcium peroxide. For use in retarding growth of mold and other microorganisms which may cause spoilage, sodium and calcium propionates, sodium diacetate, lactic acid, and monocalcium phosphate are allowed. However, the prohibition of the controversial ingredients is not expected to have any immediate effect on their use, since before the order becomes binding, its validity must be passed upon by the Supreme Court. There is no change in the maximum and minimum limits of thiamine, riboflavin, niacin, and iron as set up in the 1943 tentative standard.

This is the second time within a year that the Federal Security Agency has turned down proposals for use of new-type chemical emulsifiers in foods, the earlier prohibition being for mayonnaise, French dressing, and salad dressing. The prohibition was made on the basis that insufficient scientific work has been done on the emulsifiers and various antioxidants to permit their inclusion in official identity standards for foods.


Blodgett Ovens
PREPARE 80% OF COOKED FOOD FOR TUBERCULAR INSTITUTION
Blodgett No. 959 Roasting and Baking Oven provides carefully controlled food for patients of Charles Cook Hastings Home, Altadena, Cal.

Proper diet and nutrition is the cornerstone of the cure of tubercular patients at the Hastings Foundation Home.

Since good and carefully controlled food is of paramount importance, it is not surprising that 80 percent of the Home's cooked foods are prepared in a Blodgett No. 959 Gas-Fired Combination Oven.

According to the Hastings Foundation:

"Blodgett Ovens show versatility in preparation of meals—a few of the foods cooked being roasts, deep dishes, meat loaf, fowl, custards, puddings, cakes, pies and rolls.

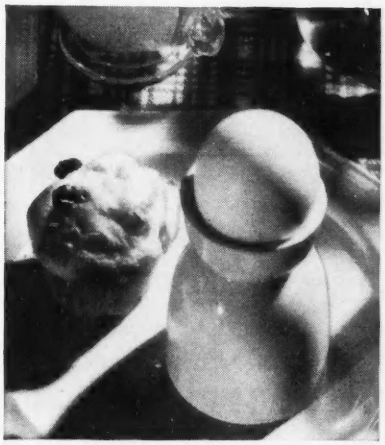
"Since December 1945, the beginning of our research in diet and better nutrition for patients, we have enjoyed fine performance and carefree service from our Blodgett baking and roasting ovens. For functional application, the Blodgett ovens have demonstrated their capacity to prepare better, more nutritious meals, and to permit efficiency in preparation of food."

ONE HUNDRED YEARS OF

THE G. S. BLODGETT CO., INC. OVENS

50 LAKESIDE AVE., BURLINGTON, VERMONT

# THE FOOD VALUES OF EGGS



**An egg contains within itself all of the essential nutritional elements for the development of a complete, new living organism.**

**An egg is, therefore, one of nature's most perfect foods.**

**One Medium Size Egg Is Approximately 56 Grams**

| Food Nutrients | Contained in | | | % of Daily Allowances* for the average Adult | | |
|---|---|---|---|---|---|---|
| | 1 Egg | 2 Eggs | 3 Eggs | 1 Egg | 2 Eggs | 3 Eggs |
| Protein | 6.6 | 13.2 | 19.8 grams | 9% | 18% | 27% |
| Calories | 79 | 158 | 237 calories | 3% | 6% | 9% |
| Calcium | .03 | .06 | .09 grams | 4% | 8% | 12% |
| Phosphorus | .11 | .22 | .33 grams | 9% | 18% | 27% |
| Iron | 1.6 | 3.2 | 4.8 mg | 13% | 26% | 39% |
| Vitamin A | 570 | 1140 | 1710 I. U. | 11% | 22% | 33% |
| Thiamine ($B_1$) | .08 | .16 | .24 mg | 5% | 10% | 15% |
| Riboflavin ($B_2$) | .19 | .38 | .57 mg | 9% | 18% | 27% |
| Vitamin D | up to 50 | 100 | 150 I. U. | up to 12% | 24% | 36% |
| Niacin | .05 | .10 | .15 mg | 3% | 6% | 9% |

**Tables of Food Composition, as described by Committee on Food Composition, Food and Nutrition Board, National Research Council.*

EGGS supply not only *biologically complete* protein (containing all of the essential amino acids) but provide the *entire* group of these amino acids in such amounts that whole-egg protein is used as a *standard in determining the nutritive value of other proteins.*

This means much in modern dietary considerations, for it has been found that protein synthesis in the body and a retention of nitrogen for growth necessitate the *simultaneous* presence of *all* of the essential amino acids.

Cannon *et al* (1) reported that protein-depleted rats recovered weight steadily when fed an adequate diet in which the only source of protein was a mixture of the ten essential amino acids. If, however, the basal ration was divided into two portions, one containing five of the amino acids and the other containing the remaining five—*and the two portions fed alternately*—poor weight recovery or even continued weight loss was obtained.

●

(1) CANNON, P. R., C. H. Steffee, L. J. Frazier, D. A. Rowley and R. C. Stepto. The influence of time of ingestion of essential amino acids upon utilization in tissue synthesis. Fed. Proc. 6, 390 (1947)

ACCEPTED COUNCIL ON FOODS AND NUTRITION AMERICAN MEDICAL ASSOCIATION

*This seal signifies that all statements herein pertaining to nutrition have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.*

## POULTRY AND EGG NATIONAL BOARD

CHICAGO 6, ILLINOIS

A NON-PROFIT ORGANIZATION

***Devoted to Research and Education Work in Behalf of the Poultry Industry***

The new bread standards state that although there is no definite evidence of injury in the amounts which are likely to occur in the diet, nevertheless investigation work already done "does not establish their safety and the record does not permit a conclusion that bread containing them is safe for continuous use over the human life span."

**New Cheese Standards Established.** New Food and Drug Administration cheese standards provide specifications for the composition of various cheese products, require more informative labels, and call for a holding period of at least sixty days for any cheese not made from pasteurized milk. The holding period has about the same effect as pasteurization. The new cheese standards, which will go into effect in six months, cover many varieties not now standardized—including brick, limburger, munster, blue, gorgonzola, and roquefort. The standards apply to imported and domestic cheeses, as well as numerous products made from cheese. Labels will identify the cheese products. Pasteurized process cheese contains at least 97 per cent cheese, ground, melted, and packaged. Pasteurized process cheese foods are similar to process cheese, but nonfat dried milk solids or dried whey or other non-cheese ingredients have been added. Pasteurized process cheese spreads are similar to cheese foods except that they contain more water to soften them. Many of these spreads contain added fruits, vegetables, or meat and are sold under various names.

**Apple Essence Gives Concentrates True Flavor.** Volatile apple essence added to frozen concentrated apple juice gives superior natural flavor, the U.S.D.A. has discovered. A taste panel at the Western Regional Laboratory, Albany, California, sampled frozen apple juice concentrates, prepared by different methods and mixed with water for serving. The two samples judged best for their true apple flavor were made with the addition of volatile apple essence. One sample was a four-fold concentrate with essence added before freezing. The other, a six-fold concentrate, was thinned to four-fold by adding fresh juice and essence, and then frozen. The method for concentrating the flavor of fruits was developed at the Eastern Regional Laboratory, Philadelphia.

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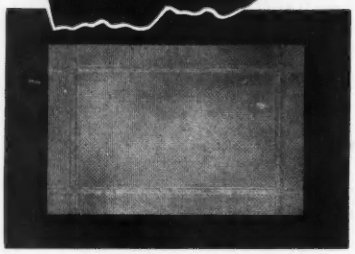
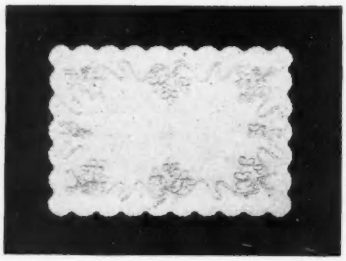
YOUR COMPLETE SOURCE OF SUPPLY FOR TRAY COVERS



*Magnilin* (Magnified Linen) is available in heavy Crepe in 12 x 18 and 15 x 20 sizes. Same sizes and design available in bond.



*Clover Linen Bond* tray covers are specially designed for "Mirro"-trays and are available in 10½ x 15¼, 12 x 18, 15 x 20 and 16 x 22 sizes.

*Rose Linen Bond* tray covers are available in a complete range of sizes including 8⅜ x 11½, 9⅝ x 12¾, 11 x 15¼, 12¾ x 16⅝, 14 x 19¼, 15⅛ x 21. They are specially designed for "Wear-Ever" Trays.

**Select The Style And Size To Fit Your Need**

You add appetite appeal to food and diet trays with attractive Milapaco tray covers. The cost is only a fraction of a cent per serving. Actually you save money by reducing laundering and sterilizing expense and increasing tray life. Easy to store and easy to use, you're always ahead when you use Milapaco.

*For distinctive service choose Milapaco Personalized Tray Covers*

Included in the complete Milapaco line are personalized tray covers. Covers printed with your special design are available at nominal cost in sizes of 10½ x 15¼, 12¾ x 16⅝, 14 x 18, 14 x 19¼, 15 x 21, 16½ x 22. Samples and details on designs, cost and art service can be obtained from your paper supplier or by writing direct to:

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## *News of State Associations*

**California Dietetic Association.** At a recent *Bay Section* meeting, Dorene Pierce, nutritionist with the Oakland chapter of the American Red Cross, told about her duties and stressed the need for trained people to work on nutrition projects in Bay Area communities. At the June meeting held at the Claremont Hotel in Berkeley, officers for the Bay Section for 1950–51 were elected: Chairman, Frances Dahl; Vice-Chairman, Virginia McMasters; Secretary-Treasurer, Clare-Beth Young; and Director, Helen Walsh.

The *Los Angeles Section* elected its officers for 1950–51 at its meeting at the Carnation Company. They are: Chairman, Lillian Emoff; Vice-Chairman, Jean Murdock, Wadworth Veterans Administration Hospital; Secretary-Treasurer, Betty Renshaw, Children's Hospital. Hostess-speaker for that meeting was Loretta Ditlow, home economist for the Carnation Company. A film produced by Carnation Company, "That Babies May Live," was shown as evidence of the progress made in developing a safe milk supply for babies and children.

**Iowa Dietetic Association.** A loan fund of $150 per year has been established by the Iowa Dietetic Association. It will be administered by a committee appointed by the president.

**Ohio Dietetic Association.** The *Akron Dietetic Association's* new officers are: President, Marcia Weston, People's Hospital; Vice-President, Jean Mallen, City Hospital; Secretary, Thelma Long, Children's Hospital; and Treasurer, Marcella Roseman.

As a public relations activity, the *Cincinnati Dietetic Association* sponsored an essay contest for all junior and senior girls in Hamilton County. The theme of the essay was "Why I Would Like to Be a Dietitian." First prize was $25; the runner-up received $10. Officers for 1950–51 are: President, Helen Volk;

# Easy, low-cost way to add IRON and THIAMINE to the diets you plan

The patient most in need of extra iron, extra thiamine, frequently proves a problem. For so often lowered digestive capacity eliminates from the diet many food sources of these nutritional essentials.

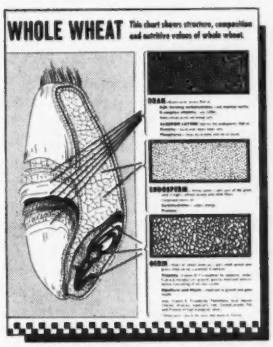
That's why readily digestible Hot Ralston Cereal may have a place in the diets you plan. It furnishes generous amounts of iron and thiamine, at a cost of about 1¢ per serving.

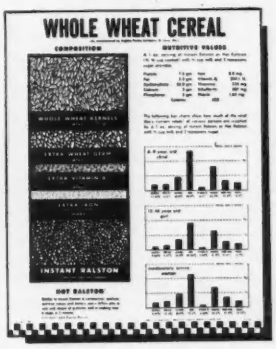
A single 1-ounce serving of Hot Ralston supplies the following percentages of the minimum daily requirement—

| | 1–6 years | 6–12 years | adults |
|---|---|---|---|
| IRON | 113% | 84.9% | 84.9% |
| THIAMINE | 84% | 56% | 42% |

Plus 3.5 Gm. PROTEIN

## NEW TEACHING AID WITH REAL WHEAT!




Novel, instructive chart contains, on one side, *actual samples* of the parts of the wheat kernel — on the other side, a cereal and its ingredients. Gives basic nutritional information about wheat. Demonstrates, visually, the contributions of whole wheat to the diet. Stimulates the interest of both professional and lay classes.

MAIL COUPON FOR **FREE** CHART

Cooks in 5 minutes

Cooks in 10 seconds

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LD-1 Checkerboard Square, St. Louis 2, Missouri
Please send:

_____ C1288—Whole Wheat Grain and Cereal Ingredient Chart. One FREE. (Additional charts 50¢ each.)

*Name* _____

*Organization* _____

*Street Address* _____

*City* _____ *Zone* _____ *State* _____

## Army Announcements Concerning Dietetic Personnel

The Department of the Army has released the following official list of names of dietitians in the Women's Medical Specialist Corps who have been separated from service:

1st Lt. Elizabeth C. Adams, R-2548
1st Lt. Martha R. Hambleton, R-2502
1st Lt. Kathleen C. Hatch, R-2104
2nd Lt. Dorothy M. Herkowski, R-2551
1st Lt. Annie R. Lanford, R-2474
1st Lt. Mary S. Lowe, R-10081
1st Lt. Helen M. S. Nygard, R-2478
2nd Lt. Lillian R. Staff, R-2538
Capt. Mary L. Timerman, R-170

The following dietitians have received initial appointments in the WMSC Reserve for Extended Active Duty:

1st Lt. Mildred E. Breimyer, R-2058
2nd Lt. Gloria R. Eberhardt, R-2573
2nd Lt. Dorothy L. Jett, R-2576
1st Lt. Ida R. Strickland, R-408

The following dietitians have received appointments in the Regular Army in the grade of Second Lieutenant:

Elizabeth J. FitzGerald, R-10103
Barbara Kennon, R-10100
Rosemary D. O'Regan, R-10101
Jessey R. Powell, R-10104
Ouida Weimer, R-10099
June E. Williams, R-10102

The following promotions of dietitians in the WMSC have been made:

*To Major*
Helena D. Quinn, R-10066
Ruby Z. Winslow, R-10006

*To Captain*
Nannie R. Evans, R-10019
Nevella S. Harris, R-10020
Rose M. MacKellar, R-10097
Doris L. Parker, R-10018, to Permanent Captain

*To Temporary First Lieutenant*
Nora J. Allen, R-2539
Allen C. Brown, R-2543
Anna G. Weigand, R-2529

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CELLU SUGAR-FREE SWEETS

ACCEPTED COUNCIL ON FOODS AND NUTRITION AMERICAN MEDICAL ASSOCIATION

RECOMMENDED BY PHYSICIANS FOR THE LOW CARBOHYDRATE DIETS

CELLU JELLY: In 5-oz. jars. Strawberry, Raspberry, Cherry, Grape flavors.

CELLU SUGARLESS SWEETENER: No food value. Looks and pours like powdered sugar.

CELLU HARD GUM DROPS: Cinnamon, Licorice, Root, Rum & Butter, Peppermint, Lemon, Lime, Orange and Raspberry flavors. Also available in lollipop form for children.

CELLU GELATIN DESSERT: six tangy flavors. In single serving envelopes of 6 to 20 to a box.

SEND FOR FREE CATALOG of over 100 Cellu Foods

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Cincinnati General Hospital; Vice-President, Marjorie White, Children's Hospital; Recording Secretary, Thelma Ratcliffe, Christ Hospital; and Corresponding Secretary, Margaret Dressler, Christ Hospital.

The *Cleveland Dietetic Association* has elected the following officers: President, Anna Banus Darling, Western Reserve University; President-Elect, Marjorie Curry, Cleveland Clinic Foundation; Vice-President, Marie Lavelle, Cleveland Clinic Hospital; Secretary, Elsie Vargo, Lutheran Hospital; and Treasurer, Esther Uhlman, Saint Luke's Hospital.

The *Columbus Dietetic Association* has elected its new officers: President, Ann Gernes, White Cross Hospital; President-Elect, Virginia Harger, Ohio State University; Vice-President, Ethel Downey, University Hospital; Secretary, Marian Gallagher, Benjamin Franklin Hospital; and Treasurer, Mary Grace Clark.

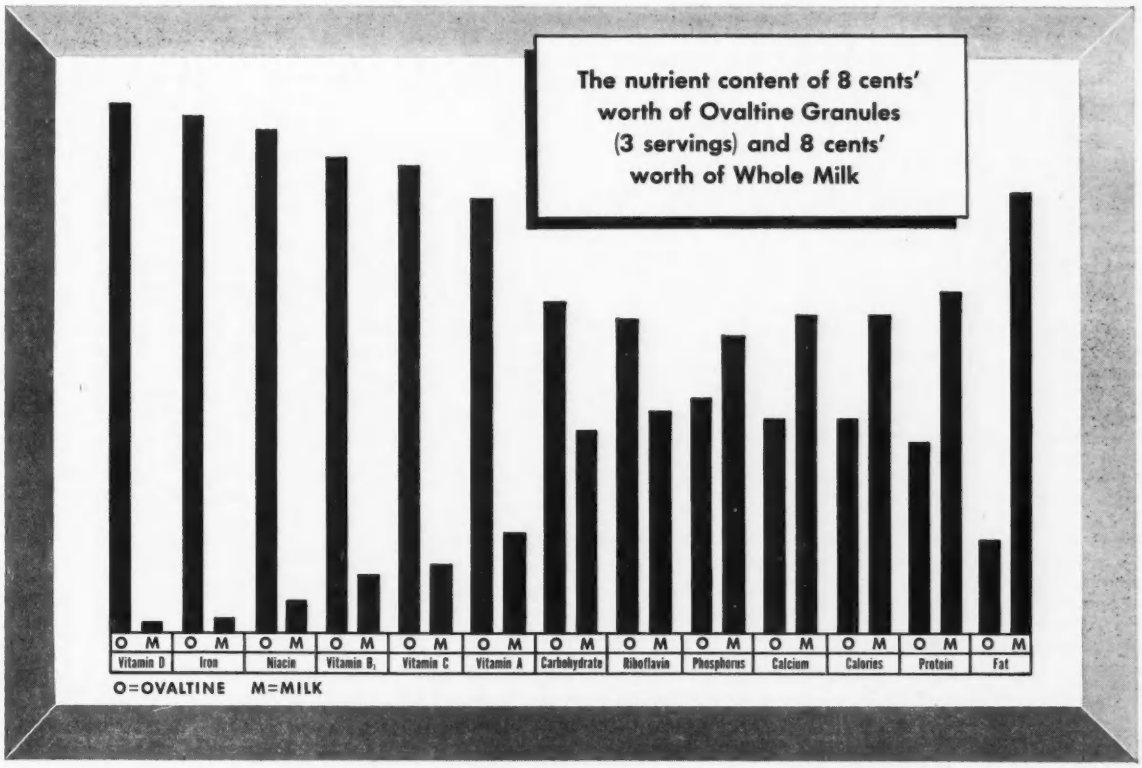
Officers for the *Dayton Dietetic Association* are: President, Vivian Laird; President-Elect, Mary Irene Hageman; Vice-President, Lois Ittleson; Secretary, Joan Slaniana; and Treasurer, Bernice Haunn.

The *Stark County Dietetic Association* elected the following officers for 1950–51: President, Mrs. J. C. Hays; Vice-President, Sister M. Anthony; Secretary, Virginia Bailey; and Treasurer, Ruth La Plante.

**South Dakota Dietetic Association.** This newest of the affiliated state associations, having only had official status since spring, has already issued a bulletin. In August, the members of the South Dakota Dietetic Association received a mimeographed newsletter from Sister M. Alma, Secretary-Treasurer. The three-page letter told about the organization of the new association and reported on activities which have been initiated by the group. The following officers of the association, elected in March, will serve until November, 1951: President, Sister M. Inez; President-Elect, L. Wilknsom; and Secretary-Treasurer, Sister M. Alma. The next meeting will be in November in Sioux Falls, when a report of the national A.D.A. convention will be given.

**Tennessee Dietetic Association.** The *Nashville-Davidson County Dietetic Association* elected the following officers for 1950–51 at its annual picnic in May: President, Evelyn Mason, Nashville General Hospital; Vice-President, Bernice Hopkins, Vanderbilt University Hospital; and Secretary-Treasurer, Moselle Peay, Mid-State Baptist Hospital.

**Virginia Dietetic Association.** Speakers at the annual spring meeting, held at Hotel Robert E. Lee, Lexington, on April 21 and 22, were: Dr. Mary de Garmo Bryan, Columbia University; Marian Floyd, U.S. Public Health Service, Washington; Rosemary Lodde Veterans Administration, Washington: Dr. W. E. Chapman, Virginia State Department of Health; and Dr. Reverdy

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| Vitamin D | 400 I.U. | 8 I.U. |
| Iron | 12 mg. | 0.3 mg. |
| Niacin | 6 mg. | 0.4 mg. |
| Thiamine | 0.90 mg. | 0.16 mg. |
| Ascorbic acid | 30 mg. | 4 mg. |
| Vitamin A | 2025 I.U. | 625 I.U. |
| Carbohydrate | 29 Gm. | 19 Gm. |
| Riboflavin | 0.75 mg. | 0.66 mg. |
| Phosphorus | 255 mg. | 363 mg. |
| Calcium | 255 mg. | 460 mg. |
| Calories | 160 | 269 |
| Protein | 6.5 Gm. | 13.6 Gm. |
| Fat | 2 Gm. | 15 Gm. |

* 8 cents' worth of Ovaltine (3 servings)
** 8 cents' worth of milk

As the bar chart so vividly indicates, Ovaltine is an exceptionally economical source of many essential nutrients. Using whole milk as the basis for comparison, the chart contrasts the relative amounts of nutrients supplied by 8 cents' worth of Ovaltine granules (3 servings) and by 8 cents' worth of whole milk. In 8 of the 13 nutrients listed, Ovaltine supplies greater amounts, and in the remaining 5, high proportions of the amounts found in milk.

It should be noted that Ovaltine specially enriches milk in those nutrients in which milk is low. Thus Ovaltine is not only economical in use but constitutes with milk an ideal protective supplementary food drink. It finds wide usefulness whenever dietary supplementation becomes necessary, either because of poor appetite, inability to consume a normal diet, or illness which often makes normal eating difficult or impossible.

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Two kinds, Plain and Chocolate Flavored.
Serving for serving, they are virtually identical in nutritional content.

D. Jones, Jr., Lewis-Gale Hospital, Roanoke. Two new members of the A.D.A., Nancy J. Warren, Winchester, and Sarah K. Brent, Charlottesville, also spoke. Officers elected for 1950–51 are: President, Elizabeth Woodard; President-Elect, Elizabeth Lounds; Secretary, Edna Cates; and Treasurer, Dorothy Perkinson.

The *Richmond Dietetic Association* for several years has financially supported projects to improve the nutritional status of various groups. The 1947 project was a supply of milk for a month to needy Negro children in a nursery school. The following year the Association had several projects, including the Afro-American Home for Aged Negroes. In 1949, the Association contributed $75 to the Margaret McDonald Loan Fund. This year's project was a contribution of $50 toward the purchase of equipment for the school lunchroom at the Mattaponi Indian School on the Indian Reservation. Officers for 1950–51 were elected at a May meeting of the *Richmond Dietetic Association:* President, Carolyn Bass, McGuire Veterans Administration Hospital; Vice-President, Dorothy Delmar, Thomas Jefferson School Cafeteria; Secretary, Phyllis Moore, Johnston Willis Hospital; and Treasurer, Margaret Kilian, Medical College of Virginia.

**West Virginia Dietetic Association.** Officers for 1950–51 for the West Virginia Dietetic Association, elected at the ninth annual meeting in March are: President, Marian McKenzie; President-Elect, Elizabeth A. Anderson; Secretary, Ruth Mathews; and Treasurer, Anna Belle Dorsey.

At the June 9 meeting of the *Charleston Dietetic Association* William H. Waggy, supervisor of surplus commodity distribution in West Virginia, gave the group information about distribution and use of surplus commodities. The Charleston group is currently presenting a bi-monthly radio series on a program titled "Mainly for Women." The first program featured Thelma Boomer of Herbert J. Thomas Memorial Hospital and Ona Frances Stinson of McMillan Hospital, who were interviewed about dietetic careers.

## *Association Activities*

**Conference on the Aging.** When the first national Conference on the Aging was held in Washington, D.C., August 14 and 15, no organizations as such were invited to have representation. However, persons specifically interested in this conference were issued invitations. Consequently, Sister Maude Behrman of Lankanau Hospital, Philadelphia, attended the conference for the American Dietetic Association.

**Crusade for Freedom.** Elizabeth Perry, in a recent letter to General Lucius D. Clay, accepted the invitation to become a member of the National Crusade Council, representing A.D.A. The Crusade for Freedom is sponsored by the National Committee for a Free Europe; its goal is to give every man, woman, and child in America the opportunity to sign a declaration of belief in the cause of world freedom and peace. Enrollment will be on Freedom Scrolls which are being circulated throughout the country. On United Nation's Day, October 24, the Scrolls will be permanently enshrined in the base of a bell tower which will house the new Freedom Bell in Berlin.

**Final Convention Arrangements Made.** Four members of the A.D.A. staff traveled to Washington early in September to meet with the local convention committees in final preparation for the A.D.A.'s 33rd Annual Meeting, October 16 to 20. Those making the trip from Chicago were Ruth M. Yakel, Mildred L. Egeberg, Thelma Pollen, and Margaret L. Ross.

**New Exhibit for A.D.A.** "Dietitians, Nutritionists—Serve the Community" is the theme of the new large exhibit which has been developed under the direction of the A.D.A. Educational Exhibits Committee. A series of twelve translites portray the dietitian and the nutritionist in roles of cooperation with the doctor, the dentist, the public health nurse, the social worker, the school teacher, and the family. These translites, which are in color, are controlled in such a way that two flash on at a time, giving action to the exhibit. It will be shown for the first time at our own convention in Washington, and then will be sent to Atlantic City for the meeting of the American Dental Society, October 30 to November 2.

**A.P.H.A. Convention.** The Association is presenting its exhibit, "Dietetics, the Career with a Choice," at the annual meeting of the American Public Health Association, to be held in St. Louis, October 30 to November 3. This is the first time in several years that A.D.A. has exhibited with the public health group.

**A.A.A.S. Meeting.** Dr. Helen Hunscher is chairman of the program committee for the A.D.A.'s part on the program of the forthcoming meeting of the American Association for the Advancement of Science. Our session will be held on Friday, December 29, at the Hotel Statler in Cleveland. Dr. Clara Mae Taylor is A.D.A.'s representative to the Council of A.A.A.S.

**Convention, 1951.** For some time now, plans have been in the making for our 1951 convention in Cleveland. Helen Robertson has accepted the chairmanship for the 34th annual meeting. A co-chairman is to be appointed later.

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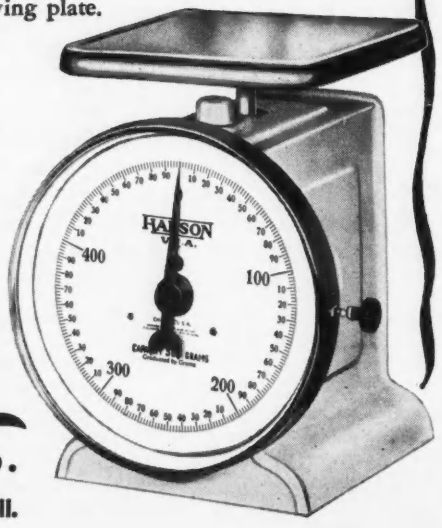

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